THOMAS PRINTWORKS

Notice to Plan Purchasers and Plan Rooms

The list of Plan Purchasers and all addenda will be posted to our bid site for your use.

www.thomasprintworks.com/bids

Please check this site regularly to keep up-to-date on the latest revisions.

Although we endeavor to notify all plan purchasers via email as updates are issued, it is your responsibility to verify that you have the most up-to-date bid information for this project. For all intents and purposes, you will be considered notified when any new files are posted to this site.

DALLAS INDEPENDENT SCHOOL DISTRICT
CONSTRUCTION SERVICES

Project Manual

VOLUME 1 OF 2

CSP 250086

Org 208 – Seagoville Elementary School – Addition and Renovation

A/E FIRM
RGM Architects, LLC

MJ Thomas Engineering, LLC
Berkenbile Landscape Architects, Inc.
Stratus Team, LLC

Drytec Moisture Protection Technology Consultants, Inc.
PMY Group
5G Studio Collaborative

April 05, 2026

DALLAS INDEPENDENT SCHOOL DISTRICT
CONSTRUCTION SERVICES

Project Manual

VOLUME 1 OF 2

CSP 250086

Org 208 – Seagoville Elementary School – Addition and Renovation

A/E FIRM
RGM Architects, LLC

April 05, 2026

ARCHITECT AND CONSULTANTS SEALS PAGE

ARCHITECT:

RGM ARCHITECTS LLC

RGM ARCHITECTS LLC
BRIAN COOK
2001 N. LAMAR STREET
SUITE 200
DALLAS, TEXAS 75202
214-625-2622



CIVIL ENGINEER:

MJ THOMAS ENGINEERING

MICHAEL THOMAS
4700 BRYANT IRVIN COURT
SUITE 204
FORT WORTH, TEXAS 76107
817-732-9839



MJ Thomas Engineering, LLC.
F-9435
03/31/2026

LANDSCAPE ARCHITECT:

BERKENBILE LANDSCAPE ARCHITECTS, INC

04-05-2026

STEPHEN BERKENBILE
2355 JOHNSON ROAD
SOUTHLAKE TEXAS 76092
214-922-9946



SECTION 00 01 07 – SEALS PAGE

STRUCTURAL ENGINEER: **CHARLES GOJER & ASSOCIATES**

CHARLES GOJER
11615 FOREST CENTRAL DR,
SUITE 303
DALLAS, TEXAS 75243
PHONE: 214.340.1199



MEP ENGINEER: **STRATUS TEAM, LLC**

BENJIE LINKOUS
757 NORTH ELDRIDGE PARKWAY
SUITE 650
HOUSTON, TEXAS 77079
PHONE: 888.250.3795



04/05/2026

ROOFING CONSULTANT: **DRYTEC MOISTURE PROTECTION**

DANIEL T. DeMEYER
5720 LBJ FREEWAY,
SUITE #480
DALLAS, TX 75240
PHONE: 214.363.2192



04-05-2026

SECTION 00 01 07 – SEALS PAGE

TECHNOLOGY CONSULTANT: **PMY GROUP**

3424 MIDCOURT ROAD, SUITE 124
CARROLLTON, TEXAS 75006
PHONE: 214.364.5920



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1.01.A Project Manual List with Revision Number and Date: April 05, 2026

Org 208 – Seagoville Elementary School – Addition and Renovation

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GS103 - ACCESSIBILITY DETAILS
GS104 - PARTITION TYPES
GS106 - OVERALL SITE PHASING PLAN
GS107 - OVERALL PHASING FLOOR PLAN
GS108 - PARTIAL ENLARGED STORM SHELTER PLAN -AREA D
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GS200 - OVERALL EGRESS FLOOR PLAN

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S303 - FOUNDATION SECTIONS AND DETAILS
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S402 - FRAMING SECTIONS AND DETAILS
S403 - FRAMING SECTIONS AND DETAILS
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S502 - CONCRETE BEAM SCHEDULES & DETAILS
S601 - TYPICAL DETAILS
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AD801 - DEMOLITION PHOTOS
AD802 - DEMOLITION PHOTOS
AD803 - DEMOLITION PHOTOS
AD804 - DEMOLITION PHOTOS
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AD806 - DEMOLITION PHOTOS
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AE300 - EXTERIOR ELEVATIONS
AE400 - PARTIAL ENLARGED FLOOR PLANS
AE401 - PARTIAL ENLARGED FLOOR PLANS
AE402 - PARTIAL ENLARGED FLOOR PLANS
AE403 - INTERIOR ELEVATIONS
AE404 - INTERIOR ELEVATIONS
AE405 - INTERIOR ELEVATIONS
AE406 - INTERIOR ELEVATIONS
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AE409 - INTERIOR ELEVATIONS
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AE502 - BUILDING SECTIONS
AE503 - BUILDING SECTIONS
AE504 - BUILDING SECTIONS
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AE603 - PARTIAL ENLARGED REFLECTED CEILING PLAN - AREA C
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AE701 - DOOR & WINDOW FRAME DETAILS
AE703 - ROOM FINISH SCHEDULES
AE900 - STANDARD ROOM SIGNAGE
AE901 - STORM SHELTER SIGNAGE
AE900 - ROOM SIGNAGE FLOOR PLAN
AI200 - OVERALL FLOOR PLAN
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M-105 - MECHANICAL PIPING PLAN
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E-303 - ELECTRICAL LOW VOLTAGE PLAN -FIRE ALARM AREA C
E-401 - ELECTRICAL SITE PLAN
ED-101 - ELECTRICAL DEMOLITION PLAN -POWER & FIRE ALARM
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T101 - TECHNOLOGY -FLOOR PLAN -AREA A
T102 - TECHNOLOGY -FLOOR PLAN -AREA B
T103 - TECHNOLOGY -FLOOR PLAN -AREA C
T104 - TECHNOLOGY -FLOOR PLAN -AREA D
T500 - TECHNOLOGY -DETAILS
T501 - TECHNOLOGY -DETAILS
T502 - TECHNOLOGY -DETAILS
T600 - TECHNOLOGY -SECURITY DETAILS
T601 - TECHNOLOGY -SECURITY DETAILS
T602 - TECHNOLOGY -SECURITY DETAILS
T700 - TECHNOLOGY -AV DETAILS
T701 - TECHNOLOGY -AV DETAILS

Procurement Services April 05, 2026

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
250086	Org 208 – Seagoville Elementary School – Addition and Renovation	05/06/2026	MH

A pre-proposal meeting will be held via Team's at 10:00am on Tuesday April 14, 2026 for all interested parties. This meeting is not mandatory, but information discussed will be extremely helpful in preparation of the proposal.

Team's Meeting Information:
Meeting ID: 286 067 923 270 90
Passcode: jx9i4rJ7

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 tour. The following is the schedule for the site tour:

School Org#	School Name	Date	Time	School Address, Location of Meeting
Org 208	Seagoville Elementary School	April 14, 2026	12:00 PM	304 N Kaufman St. Seagoville, TX 75159

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 Wednesday, 5/6/2026 at 2:00 PM** (local time).

Completed CSP Package **Part 2 is due on Thursday, 5/7/2026 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 3:00 P.M. local time upon submittal of Part 2 of the Package, via Team's at Dallas ISD Construction Services, Linus D. Wright Dallas ISD Administration Building 9400 North Central Expressway, Suite 800 Dallas, TX 75231.

Team's Meetings Information:
Meeting ID: 259 747 077 748 60
Passcode: Kt2zr9iF

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:
4/5/2026 and 4/12/2026

DALLAS INDEPENDENT SCHOOL DISTRICT

PROCUREMENT SERVICES – CONSTRUCTION SERVICES

DOCUMENT DISTRIBUTION

CONSTRUCTION SERVICES

CSP 250086
Org 208 - Seagoville Elementary School – Addition and Renovation
J208_P0426_1

SOLICITATION TIMELINE:

Issue Date:	April 05, 2026
First Advertisement Date	April 05, 2026
Second Advertisement Date	April 12, 2026
Preproposal Meeting	April 14, 2026 at 10:00 AM CST
Question Deadline	April 20, 2026
Question Responses from the District	April 27, 2026
CSP Response Due Dates Pt 1-A, Pt 1-B, and Pt 1-C	May 06, 2026 at 2:00 PM CST
CSP Response Due Date Pt 2	May 07, 2026 at 3:00 PM CST
CSP Evaluation	May 13, 2026
Anticipated Board Approval	June 25, 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 250086 $7,205,659.00

3. Scope of Work. The Work consists of:

Org 208 – Seagoville Elementary School - Project consists of the following:

1. Construction of a new storm shelter addition.
2. Renovation and installation of a new secure vestibule.
3. Renovation of the existing Special Education (SPED) classroom.
4. Installation of new landscaping associated with the storm shelter addition.
5. Reconfiguration of the existing driveway to accommodate the new storm shelter addition.
6. Removal and replacement of the existing digital marquee signage.
7. Demolition and removal of existing portable buildings, including associated covers and sidewalks; disconnection of power and fire alarm systems; and regrading of the area in accordance with civil drawings.
8. Furnishing and installation of a new public address (PA) system.
9. Furnishing and installation of a new fire alarm system.
10. Construction of a new wall to separate the IDF room from the break room.

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 **CSP 250086** in the subject line of your email.

DOCUMENT DISTRIBUTION
CSP PACKAGE 250086

Documents will be distributed as follows:

Hard copy and file distribution are provided, beginning Monday, April 6, 2026.

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 250086

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: RGM Architects, LLC 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 provied 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 250086, consisting of improvements to:

Org #	PROJECT NAME	PROJECT TYPE	ADDRESS
Org 208	Seagoville Elementary School	Addition and Renovation	304 N Kaufman St. Seagoville, TX 75159

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- 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)

Zafar Syed 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 **Zafar Syed.** During construction, the PM shall have authority to act on behalf of Dallas ISD for Owner related direction.

Zafar Syed, 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: **972-925-7376**
E-mail: **C264@dallasisd.org**

1.04 ARCHITECT/ENGINEER FIRM (A/E)

RGM Architects, LLC 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 **April 05, 2026**. All correspondence and

communication regarding these documents shall be directed to the Architect/Engineer (A/E) with a copy to Project Manager.

RGM Architects, LLC
2001 N. Lamar Street, Suite 200
Dallas, Texas 75202
Main Contact: **Jose Rojas**
Phone: **214.625.2622**
Fax: **None**
Email: **jrojas@rgmarchitects.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 *(Duration includes 30–45 days for City 311T/411Q execution,10% float, and 30 days for third-party testing.)*	Final COMPLETION
Org 208 – Seagoville Elementary School – Addition and Renovation	NTP + 300 Calendar Days	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)	Total Other Owner Allowances	Estimated Construction Budget (CCL + IC + Allowances)
Org 208	Seagoville Elementary School – Addition and Renovation	$6,647,032.00	$343,127.00	$215,500.00	$7,205,659.00

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.

Dallas Independent School District
Construction Services
After Hour Work | Holiday Authorization Form

PMF USE ONLY: ___ NON-REIMBURSABLE ___ REIMBURSABLE FUND CODE: _____

SECTION A. GENERAL INFORMATION:

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

Contractor Name: _____ Scope: _____

Name of Dallas ISD Operations Employee: _____ Employee ID #:_____

Dallas ISD Operations Employee Contact Number: _____

SECTION B. POST-WORK CERTIFICATION:

Contractor Person: _____In-Charge Signature: _____Date: _____

Project Manager Signature Approval: _____ Date: _____

DAY OF THE WEEK	DATE WORKED	(#) HOURS WORKED	ACTIVITY CODE	BIOMETRIC CLOCK USED*
FRIDAY				
SATURDAY				
SUNDAY				
MONDAY				
TUESDAY				
WEDNESDAY				
THURSDAY				

*Staff are expected to clock in and out for the use of Supplemental Secondary Pay Source
Check "X" if YES, if NOT use-See Step 3 on Process for Pre & Post Work Certification Cover Sheet

Form Updated: December 15, 2024

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 250086
Org 208 – Seagoville Elementary School – Addition and Renovation

Due 05/06/2026
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 05/07/2026
Time Due: 3:00pm
Part 2
<<Name of Proposer>>

Proposals will be read at 3:00pm 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.

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:

DALLAS INDEPENDENT SCHOOL DISTRICT

Materials Escalation Price Reconciliation Form

1454765-v1/12396-124000

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) 250086, consisting of improvements to:

ORG #	PROJECT NAME	PROJECT TYPE	ADDRESS
Org 208	Seagoville Elementary School	Addition and Renovation	304 N Kaufman St. Seagoville, TX 75159

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 250086

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 250086, 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:	**$343,127.00**
2.09 C: Other Owner Allowances (provided by Owner, see 2.09 C below):	**$215,500.00**
2.09 D: Proposer's Abatement Cost included in 2.08 A (Abatement is to be included in GC Base scope price. The intent of this section is to show the breakout of the abatement cost.)	
2.08 A: Proposer's Base Price plus (+) Allowances (should equal amount in Section 2.08 A above):	**$**

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 ($)
Org 208	Seagoville Elementary School	$343,127.00

C	Allowance Description: In Contract Owner Controlled Allowances	
001	Interior Barrier Graphics	$7,500.00
002	Exterior Construction Screening Graphics	$8,000.00
003	Turnkey Security Scope (See section 01 21 00 for more details on allowance)	$200,000.00

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
Org 208	Seagoville Elementary School – Addition and Renovation	$7,205,659.00	

Name of Contractor	

Org #	School Name	Owner's Expected Substantial Completion Date	Proposer's Proposed Substantial Completion Date *(Duration must include 30–45 days for City 311T/411Q execution (if applicable), 10% float, and 30 days for third-party testing.)*
Org 208	Seagoville Elementary School	NTP + 300 Calendar Days	

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
Org 208	Seagoville Elementary 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 250086, consisting of improvements to:

Org #	PROJECT NAME	PROJECT TYPE	ADDRESS
Org 208	Seagoville Elementary School	Addition and Renovation	304 N Kaufman St. Seagoville, TX 75159

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 208 – Seagoville Elementary School – Addition and Renovation

NOTE FOR ADD ALTERNATE SCOPE: THE COST OF ALL ASSOCIATED TRADES, THAT ARE REQUIRED TO COMPLETE ADD ALTERNATES SCOPE, (LIKE MECHANICAL, ELECTRICAL, ARCHITECTURAL ETC.) SHOULD BE INCLUDED IN THE ADD ALTERNATE LUMP SUM COST AND MUST BE REMOVED FROM THE BASE BID
***REFERENCED SHEETS IN THIS TABLE ARE NOT ALL INCLUSIVE. CONTRACTOR IS RESPONSIBLE TO REVIEW ALL RELEVANT SHEETS PROVIDED IN THE CONTRACT DOCUMENTS.**
NOTE: REFER TO HAZMAT SURVEY REPORT. IF ANY OF THE ADD ALTERNATE SCOPE REQUIRES ACM ABATEMENT, THE COST OF THE ACM ABATEMENT TO BE INCLUDED IN THE LUMP SUM COST OF THE ADD ALTERNATE. ACM ABATEMENT COST OF ANY ADD ALTERNATE SCOPE, MUST BE REMOVED FROM THE BASE BID.

No.	* Sheet Number(s)	Alternate Description	Proposer's Add Price	Proposer's Deduct Price
1	C1.12, C1.15, C1.16	Contractor shall include in his bid: • Contractor shall provide a topographic survey centered on the full storm sewer alignment from the drop inlet to the outfall approximately 400LF long with 50' on both sides of the existing 36" storm line to be removed and replaced. The topo shall include a cad file, points file with descriptions and elevations all on the same coordinate system as the original plans. The survey shall be provided by		N/A

Name of Contractor	

		a licensed professional surveyor in the state of Texas and shall be signed and sealed as required by the State of Texas governing entity. The survey shall include all existing features, grade breaks, trees, flowlines, pipe sizes, manholes, headwalls, retaining walls, fencing material +height…….. within the bounds. The survey shall extend a minimum of 50' downstream of the outfall for the 36" storm line. • Remove and replace 340 LF of 36" Dia. CMP with 36" Dia. HDPE with water tight joints per plan details • Connect to existing drop inlet by coring • Remove, demolish and dispose of existing headwall and replace with 1-36" CH-PW-0 TXDOT headwall as standard and as detailed in the plans • Construct 500 SY of 6" thick grouted rock rip-rap with 12" nominal diameter rock underlaid by filter fabric extending from the headwall outward as approved by the civil engineer. • Contractor to provide solid sod to match existing • The contractor shall remove and replace any existing fencing, retaining walls or other existing improvements with like kind as required to facilitate construction. • Contractor shall remove and replace any vegetation, trees or landscape as required and per city requirements.		

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.

Org 208 – Seagoville Elementary School – Addition and Renovation
Note: Change in depth of piers (Deduct unit price to be no less than 95% of add unit price.)

No.	Unit Price Item	ADD per LF	DEDUCT per LF
001	36" Diameter Pier	$	$

Note: Pier Casings (Deduct unit price to be no less than 95% of add unit price.)

No.	Unit Price Item	Number of piers with 10 feet of casing to be included in the base bid	ADD per LF	DEDUCT per LF
001	36" Diameter Pier Casings	20	$	$

Note: IF NO CASING IS REQUIRED, 10 FEET PIER CASING CREDIT WILL BE PROCESSED BASED ON THE DEDUCT PRICE LISTED ABOVE

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.	

SECTION 00 41 13 – TECHNICAL PROPOSAL FORM

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: CSP 250086
Solicitation Title: Org 208 – Seagoville Elementary 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.

Notice to Offerors
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: CSP 250086
Solicitation Title: Org 208 – Seagoville Elementary 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: CSP 250086
Solicitation Title: Org 208 – Seagoville Elementary 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

SBE Compliance Guidelines and Forms

Date Issued:
August 27, 2025

Contact Info:
Small Business Office
9400 N. Central Expressway
Dallas, TX 75231
972-925-7290
Email: sbo-construction@dallasisd.org
Website: www.dallasisd.org
Contact: Wilton Munnings
972-925-7222

Read Carefully: The SBE Program requirements are applicable to any bidder/proposer. These forms should be attached to any bid/proposal totaling $50,000 or more and are due at the time of bid/proposal opening.

Small Business Enterprise Program

It is the district's goal to foster the participation of small business enterprises in all facets of the district's contracting and purchasing activities. The district's aspirational small business enterprise (SBE) goal is 30% of the total dollar value of all district contracts for goods, services, and construction. For bond-funded contracts, the district's aspirational SBE goal for construction is 30% and 35% for professional services.

Pursuant to Section 3 of the Small Business Act and Small Business Administration Regulations (13 CFR Part 121), a small business enterprise is defined as a for-profit business that is independently owned and operated and meets the size standards set by the U.S. Small Business Administration (SBA).

For more details, including SBA size standards, please visit the Small Business Office website: www.dallasisd.org/sbo.

SECTION 1. | SMALL BUSINESS CERTIFICATION INFORMATION

Is your company certified as a ☐ 8(a) Certification ☐ Service-Disabled Veteran-Owned Small Business (SDVOSB) ☐ Small Business Enterprise (SBE) ☐ Veteran-Owned Small Business (VOSB) ☐ Woman-Owned Small Business (WOSB) by one of the Dallas ISD approved certification agencies listed below?

☐ No

☐ Yes, *if yes, please provide the information below and attach a copy of your certificate.*

Certification Agency	
Certification Number	
Certification Expiration Date	
Did You Attach Your Certificate?	☐ Yes ☐ No

Approved Certifications:

- 8(a) Certification
- Service-Disabled Veteran-Owned Small Business (SDVOSB)
- Small Business Enterprise (SBE)
- Veteran-Owned Small Business (VOSB)
- Woman-Owned Small Business (WOSB)

Approved Certification Agencies:

- Cherokee Tribal Employment Rights Office
- Chickasaw Nation
- Choctaw Nation of Oklahoma
- City of Austin
- City of Houston
- Corpus Christi Regional Transportation Authority
- Dallas/Fort Worth Business Council
- Muscogee Nation
- National Supplier Development Council
- North Central Texas Regional Certification Agency
- Small Business Administration
- South Central Texas Regional Certification Agency
- Texas Department of Transportation
- Texas Comptroller of Public Accounts
- Women's Business Council Southwest
- Women's Business Enterprise National Council

SECTION 2. | SMALL BUSINESS OFFICE SCORING CRITERIA

The scoring criteria provides guidance on how your submission will be evaluated by the Small Business Office (SBO). Scores are based on the information provided in the compliance guidelines and forms. All master agreements must be signed by all parties and notarized.

A.	**SBE Enhancements and Capacity Building**	**Up to 3 Points**

The proposer demonstrates commitment to the district's Small Business Enterprise (SBE) Program by implementing processes and initiatives that support and build SBE capacity. Responses should describe current strategies and activities that promote SBE growth, development, and long-term participation in district contracts, with supporting documentation provided. Examples may include, but are not limited to:

- Expedited payments to SBEs to support cash flow
- Business development programs, such as coaching, mentoring, or mentor-protégé partnerships
- Early release of retainage to assist SBEs with project sustainability
- Expanding opportunities for certified subcontractors, particularly firms that have not conducted business with the district within the past five (5) years
- Outreach activities designed to strengthen SBE engagement, such as workshops, trainings, networking sessions, or one-on-one consultations

B.	**SBE References**	**Up to 2 Points**

The proposer has provided a list of two (2) SBE subcontractor references (*not required to be certified*) that have previously performed work for them. Please provide the most current information. Only two (2) attempts will be made to contact each reference. Section 5, Page 4

C.	**Certified SBE | Joint Venture /Prime Subcontractor Teaming Agreement**	**Up to 5 Points**

- The proposer is a certified SBE (Section 1, Page 2); **or**
- The proposer has submitted a signed, dated & notarized Dallas ISD Master Joint Venture Agreement **or** Dallas ISD Master Prime Subcontractor Teaming Agreement with a certified SBE

D.	**SBE Subcontractor Utilization**	**Up to 5 Points**

- Proposer has provided a list of certified SBE subcontractors, subconsultants, or suppliers that will be utilized to meet or exceed the district's aspirational SBE goal of 30% for goods, services and construction. Section 7, Page 5 **or**
- Good Faith Effort. Proposer has demonstrated a bona fide good faith effort to engage certified SBEs toward the 30% aspirational goal. Section 10, Page 7

Note: A Change of Subcontractor Form may be found at www.dallasisd.org/sboforms

E.	**SBE Participation Plan**	**Up to 5 Points**

Proposers intending to utilize SBE-certified subcontractors to meet the district's Small Business Enterprise participation goals may submit a detailed SBE Participation Plan. This plan should demonstrate your company's commitment to meaningful utilization of SBEs and provide clear procedures for oversight, compliance, and accountability.

The plan should address how you will implement the following:

- Engage and collaborate with your proposed SBE-certified subcontractors
- Identify the individual responsible for SBE compliance and oversight
- Ensure that all proposed subcontractors are utilized as committed
- Meet or exceed your proposed SBE commitment
- Obtain approval from the Small Business Office prior to making any changes.
- Submit proof of certified SBE subcontractor payments monthly in B2G Compliance Audit Summary

Note: A Change of Subcontractor Form may be found at www.dallasisd.org/sboforms

Total Possible Points	**Up to 20 Points**

SECTION 3. | JOINT VENTURE

Are you bidding as a Joint Venture (JV)?

☐ Yes [Visit www.dallasisd.org/sboforms for instructions on how to bid as a Joint Venture for CSP].
The Dallas ISD Master Joint Venture Agreement must be signed, dated, notarized, and attached with your response.

☐ No

SECTION 4. | PRIME-SUBCONTRACTOR TEAM

Are you bidding as a Prime-Subcontractor Team?

☐ Yes [Visit www.dallasisd.org/sboforms for instructions on how to bid as a Prime-Subcontractor Team for CSP].
The Dallas ISD Master Prime-Subcontractor Teaming Agreement must be signed, dated, notarized, and attached with your response.

☐ No

SECTION 5. | SBE REFERENCES

List two (2) small business enterprise subcontractors *(not required to be certified)* that have performed work for your company. *Provide the most current information. Only two (2) attempts will be made to contact your references.*

Company Name	
Contact Person	
Email	
Phone Number	
Project Name	

Company Name	
Contact Person	
Email	
Phone Number	
Project Name	

SECTION 6. | MENTOR PROTEGE

Does your company participate in a Mentor Protégé Program as a mentor to an SBE company?

☐ Yes [If yes, attach a signed, dated, notarized copy of the Mentor Protégé Agreement, notarized minutes, and any supporting documents. It is the responsibility of the mentor to create and provide the agreement.
The Mentor Protégé Agreement must be attached with your response.]

☐ No

SECTION 7. | SUBCONTRACTOR UTILIZATION

Will you utilize any subcontractors, subconsultants or suppliers as part of this bid/proposal?

☐ Yes [Complete Sections 8 and 9]

☐ No

SECTION 8. | SUBCONTRACTOR COMPLIANCE REPORTING

The Small Business Office utilizes B2G Now, a Contract Compliance System, to monitor monthly compliance reporting. Please identify the individual responsible for entering and maintaining subcontractor payment information in the B2G Now system and who is knowledgeable about Small Business Enterprise (SBE) utilization for this project.

Contact Person:	
Title:	
Email:	
Phone:	

SECTION 9. | SUBCONTRACTOR LISTING

List all subcontractors, suppliers, subconsultants, or sole proprietors that will be utilized in this bid/proposal. Attach a copy of the current certification for each certified subcontractor.

Only certified small business enterprises (SBE) subcontractors, suppliers, subconsultants, or sole proprietors will be counted towards the small business enterprise goals.

Need to include more subcontractors? You may make copies of Page 6 or complete a Subcontractor Utilization Listing Form, available at www.dallasisd.org/sboforms

Subcontractor/Supplier Information | Complete All Fields Below							
Company's Name							
Address							
City				State		Zip	
Contact's Name	First Name		Last Name				
Phone		Email					
SBE	☐ 8(a) ☐ SDVOSB ☐ SBE ☐ OSB ☐ WOSB			Certified SBE	☐ Yes ☐ No		
Certification Agency				Certification #			
Scope of Work							
Contract Amount	$				SBE %	%	

DALLAS INDEPENDENT SCHOOL DISTRICT

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

Subcontractor/Supplier Information | Complete All Fields Below							
Company's Name							
Address							
City			State		Zip		
Contact's Name	First Name		Last Name				
Phone		Email					
SBE	☐ 8(a) ☐ SDVOSB ☐ SBE ☐ VOSB ☐ WOSB			Certified SBE	☐ Yes ☐ No		
Certification Agency				Certification #			
Scope of Work							
Contract Amount	$					SBE %	%

Subcontractor/Supplier Information | Complete All Fields Below							
Company's Name							
Address							
City			State		Zip		
Contact's Name	First Name		Last Name				
Phone		Email					
SBE	☐ 8(a) ☐ SDVOSB ☐ SBE ☐ VOSB ☐ WOSB			Certified SBE	☐ Yes ☐ No		
Certification Agency				Certification #			
Scope of Work							
Contract Amount	$					SBE %	%

Subcontractor/Supplier Information | Complete All Fields Below							
Company's Name							
Address							
City			State		Zip		
Contact's Name	First Name		Last Name				
Phone		Email					
SBE	☐ 8(a) ☐ SDVOSB ☐ SBE ☐ VOSB ☐ WOSB			Certified SBE	☐ Yes ☐ No		
Certification Agency				Certification #			
Scope of Work							
Contract Amount	$					SBE %	%

SECTION 10. | GOOD FAITH EFFORT

Vendors are not required to submit Good Faith Effort documentation if certified SBE subcontractors are listed in Section 9, Pages 5–6 of these forms.

The Good Faith Effort (GFE) Program provides an opportunity for prime vendors who plan to use only non-certified SBE subcontractors to demonstrate their collaborative efforts to engage and include Small Business Enterprises (SBEs) in the project.

To qualify, the vendor must show that a reasonable and comprehensive effort was made to identify, solicit, and engage qualified SBE subcontractors. The submission should include sufficient documentation supporting these efforts, such as outreach records, communications, or other engagement activities.

The GFE criteria allows Dallas ISD to determine whether a prime vendor has made a bona fide good faith effort to meet SBE aspirational goals. Vendors who do not demonstrate a good faith effort may forfeit up to 5 points, as outlined in Scoring Criteria Section D, Page 3 of the SBE forms.

For additional explanation view the Good Faith Elements and Required Documentation form by visiting www.dallasisd.org/sboforms.

The good faith elements and point assignments are:

Good Faith Element	**Points**
Advertising and marketing opportunities to SBEs	5 Points
Providing outreach opportunity to identify qualified SBEs	15 Points
Participating in the pre-bid meeting to engage potential SBE subcontractors	5 Points
Providing timely written notice to qualified SBEs at least two weeks before bid opening	30 Points
Providing sufficient time for SBEs to prepare and submit competitive bids	10 Points
Soliciting work scopes that are feasible for SBEs to perform	10 Points
Negotiating in good faith with qualified SBEs	15 Points
Offering help with financing, bonding, insurance, certification, or mentoring to SBEs	10 Points
Total	**100 Points**

SECTION 11. | ONLINE RESOURCES

The following forms and information can be found by visiting www.dallasisd.org/sboforms

- Certified SBE Listing Request Form
- Change of Subcontractor Form
- Dallas ISD Master Joint Venture Agreement
- Dallas ISD Master Prime-Subcontractor Teaming Agreement
- Frequently Asked Questions (FAQ)
- Good Faith Effort Explanation and Required Documentation
- Instructions on Completing the SBE Forms
- Letter of Intent to Subcontract Form *(to be submitted after contract is awarded)*
- Pay Activity Report (PAR) *(to be submitted after contract is awarded)*
- SBE Compliance Guidelines and Forms for Goods and Services - Fillable
- Subcontractor Utilization Listing Form (Section 8)

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.

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A101

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

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2 THE WORK OF THIS CONTRACT

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7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

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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 MMMM 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

OWNER *(Signature)*

<<Insert DISD Signer Name & Title>>

(Printed name and title)

<INSERT CONTRACTOR LEGAL NAME>

CONTRACTOR *(Signature)*

<<Insert GC's Signer Name & Title>>

(Printed name and title)

Approved As To Form:

_____

DALLAS ISD LEGAL COUNSEL*(Signature)*_____Date____

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DRAFT

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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[« »] **§ 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.)*

« »

§ 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 AND SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A201

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AIA® Document A201™ – 2017

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

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10 PROTECTION OF PERSONS AND PROPERTY

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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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

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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 § 61.104036, 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 InstruDocuments 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 InstruDocuments 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 MANAGERSInitial 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~~ion of~~e 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 ~~does~~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. Sseq.*, 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 InsuranceOwner'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 purchasinge 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. TheIf 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 AgreementContract

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 ~~I~~initially Decision Maker for initial decision. to ~~t~~The Architect for written recommendation~~will 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 Contractor~~claimant ~~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 Architect~~Initial 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 Architect~~Initial Decision Maker ~~in making a written recommendation~~rendering 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 Architect~~Initial 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 Architect~~Initial Decision Maker ~~1when the response or supporting data will be furnished, or (3) advise the Architect~~Initial 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.

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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

DRAFT

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SECTION 00 55 00 – NOTICE TO PROCEED FORM

Name of Contractor	

The following form will be used by the District as a formal notice to proceed with pre-construction and construction activities, respectively.

The “Notice to Proceed” is the authorization to proceed with the work in accordance with said Construction Contract and the Contract Documents. This form shall be executed after issuance of the executed contract and purchase order.

NOTICE TO PROCEED

Date

GENERAL CONTRACTOR FULL NAME OF COMPANY
General Contractor Rep.
Address
City, State Zip

PROJECT: School Name, TEA Org#, associated with CSP Package #

OWNER: Dallas Independent School District

ATTENTION:

This notice shall be your authorization to proceed with the work in accordance with the terms and conditions as referenced in the Construction Contract and the Contract documents as enumerated therein.

Furthermore, the date of <<NTP Date>> is hereby established as day “0” (zero) of the Construction Schedule and establishes the date of Substantial Completion (Full NTP Date + XXX Calendar Days) unless modified in accordance with the General and Supplementary Conditions of the Contract.

FOR DALLAS INDEPENDENT SCHOOL DISTRICT

By _____

Title _____

cc: Chief Brent Alfred
cc: E.D. Michael Garcia
cc: Dir. Jaime Garcia
cc: Dir. Tara Lott

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.

DALLAS INDEPENDENT SCHOOL DISTRICT CONSTRUCTION MINIMUM SAFETY PROGRAM GUIDELINES MANUAL

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, Jaime Garcia
Direct (972) 925-7224 | Mobile (817) 995-6792 | Email jaigarcia@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.

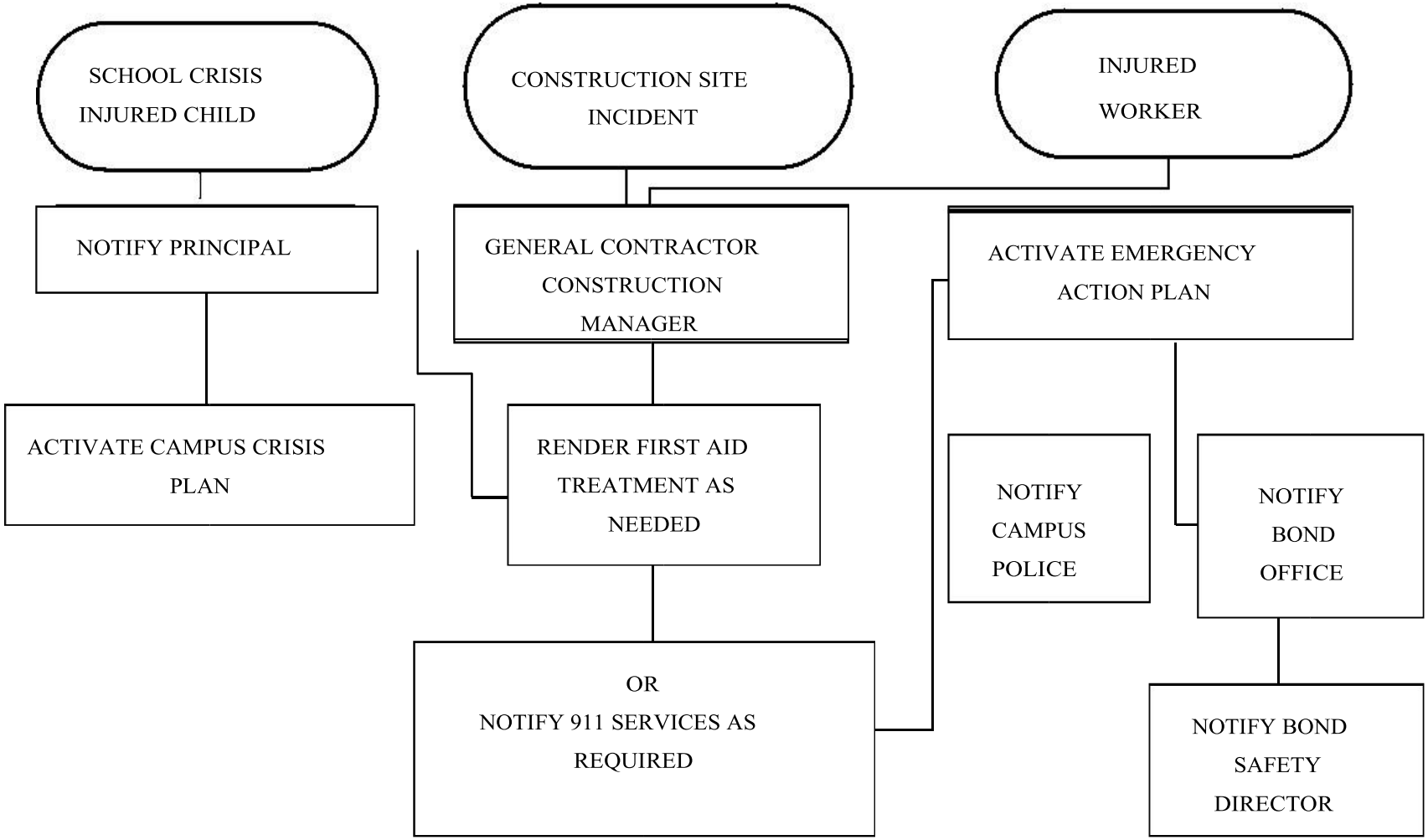
a) General Contractors and Subcontractors of any tier must instruct all workers to immediately report every incident to their supervisor, even if there is no obvious injury or property damage. Supervisors must immediately notify the General Contractor, who must immediately notify the Owner's Representative 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	William French	(972) 903-7079

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)

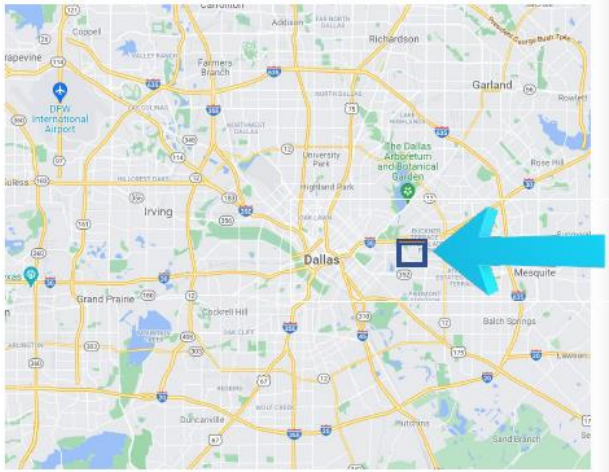
ATTACHMENTS

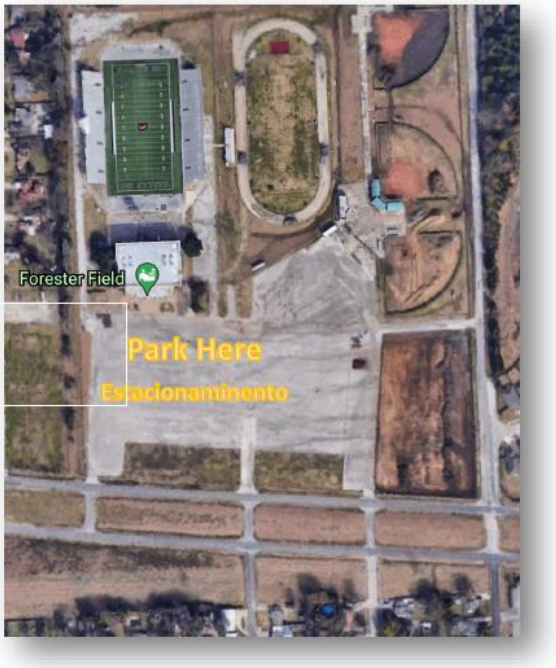
- Attachment I – Dallas ISD Orientation Location and Schedule
- Attachment II – Site-Specific Safety Plan Guidelines
- Attachment III – Crisis Communications Poster
- Attachment IV – Visitor's Release and Hold Harmless Agreement
- Attachment V – Shutdown Notification Guidelines
- Attachment VI – SWPPP 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

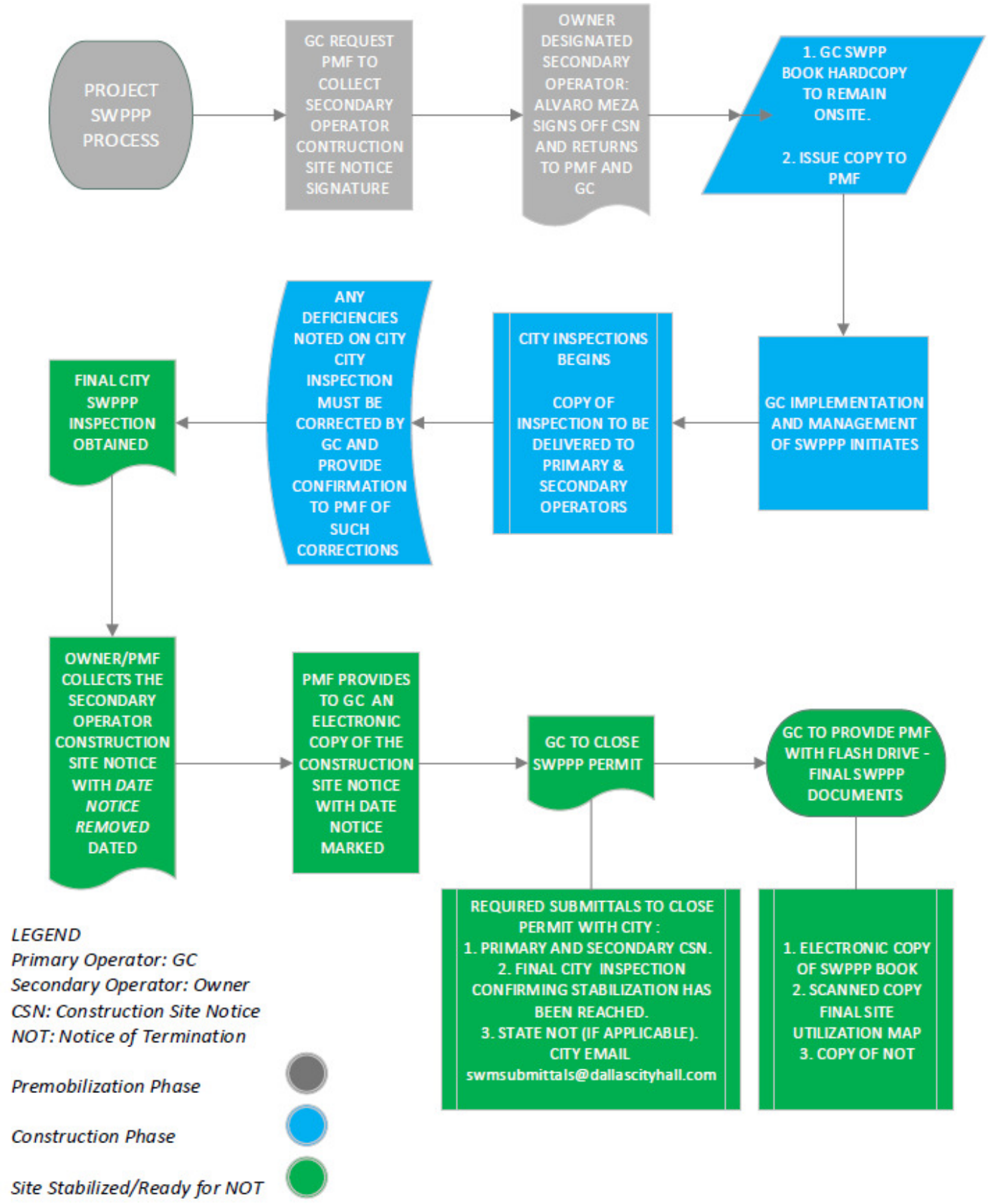
Content of notification:

- ✓ 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:

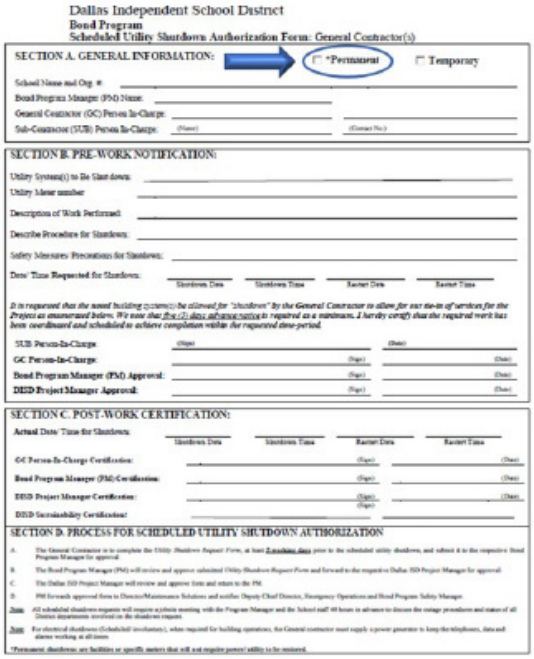
1. **Utility Shutdown request should select PERMANENT on the top right portion of our authorization form. (See below sample)**

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 noted building systems 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 2 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.

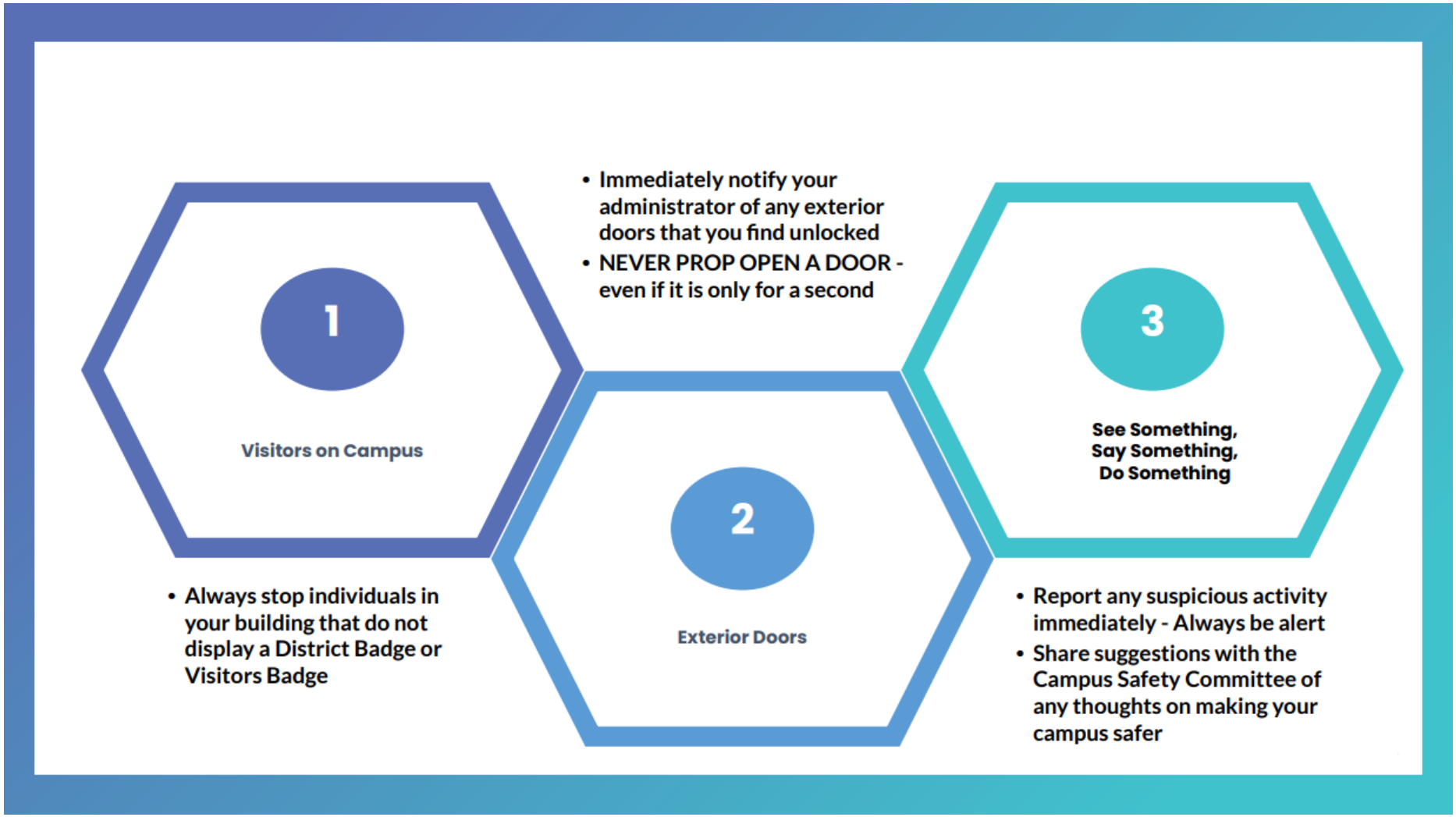
Propped Doors and Secured Areas

- ✓ **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 William French 972-903-7079 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

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 - 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

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

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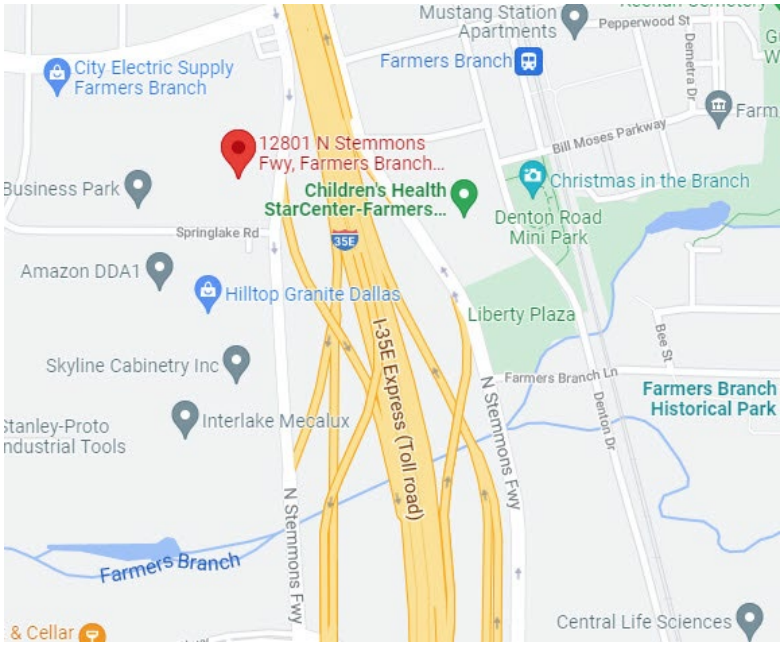
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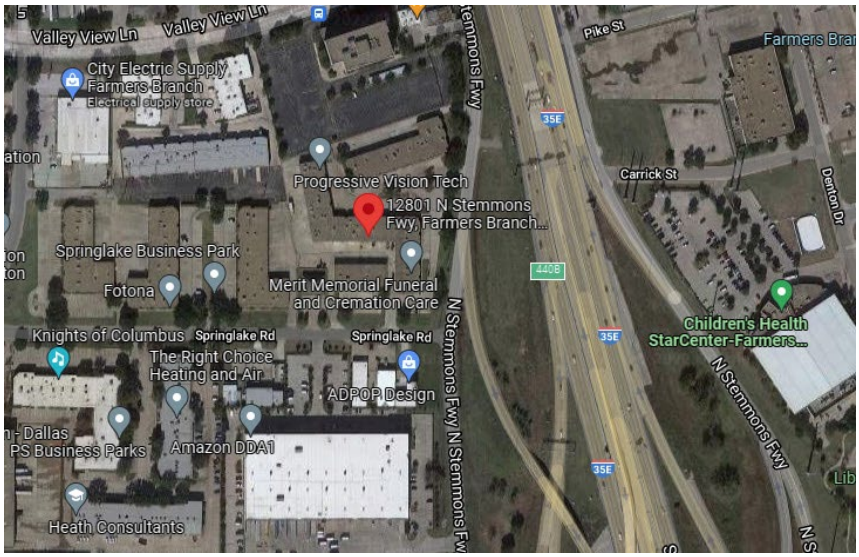
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SECTION 01 10 00 – SUMMARY OF WORK

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 208 – Seagoville Elementary School – Renovation
1. Construction of a new storm shelter addition.
2. Renovation and installation of a new secure vestibule.
3. Renovation of the existing Special Education (SPED) classroom.
4. Installation of new landscaping associated with the storm shelter addition.
5. Reconfiguration of the existing driveway to accommodate the new storm shelter addition.
6. Removal and replacement of the existing digital marquee signage.
7. Demolition and removal of existing portable buildings, including associated covers and sidewalks; disconnection of power and fire alarm systems; and regrading of the area in accordance with civil drawings.
8. Furnishing and installation of a new public address (PA) system.
9. Furnishing and installation of a new fire alarm system.
10. Construction of a new wall to separate the IDF room from the break room.

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 oversee 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, and excluding the Security Scope, 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.

C. **Security Scope Allowance Breakdown**

1. Security Allowance breakdown will be required only for the Board Approved #1 ranked General Contractor during the negotiation period. Security Vendor should **not** be contacted until **after** negotiations commence.

2. Security Allowance total amount shall include Digi/Convergint turnkey scope along with Contractor Fee, Bonds, and Insurance as follows, (for funding source identification):

    a. **Devices**
        I. Campus Security Cameras
        II. Keyless Entry Card Readers
        III. Video Intercom

    b. **Infrastructure**: required to install all devices
    c. **General Contractor Managed Fee**
    d. **Bonds and Insurance** associated with the total amount of security allowance

D. The General Contractor is responsible for the coordination and management of all subs and vendors (Digi/Convergint) to ensure the turnkey security scope is completed at the same time as the rest of the scope of the project.

E. Security scope permit is under GC/Sub/Vendor as a trade permit and should be green tagged at the end of the project similarly to other trade permits.

F. The General contractor is required follow the submittal and quality controls as required by the contract documents.

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 208 – Seagoville Elementary School – Addition and Renovation
Maximum External Temporary Swing Space Classrooms	None
Maximum Temporary Restrooms	None
Swing Space Classrooms Provided Within Existing Facilities	None

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)
None	
None	

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."

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:		PMF:	
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 21 Section 21 0800 – Commissioning of Fire Suppression

B. Division 22 Section 22 0800 – Commissioning of Plumbing Systems

C. Division 23 Section 23 0800 – Commissioning of HVAC Systems

D. Division 26 Section 26 0800 – Commissioning of Electrical Systems

E. 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 9100





ECS Southwest, LLP

Geotechnical Engineering Report

Seagoville ES Renovation (ORG 208)

304 N Kaufman Street

Seagoville, Dallas County, Texas

ECS Project Number 19:10333

March 19, 2026

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Mr. Syed Zafar
Dallas Independent School District
9400 N. Central Expressway Suite 800
Dallas, Texas 75231

ECS Project No. 19:10333

Reference: Geotechnical Engineering Report
Seagoville ES Renovation (ORG 208)
304 N Kaufman Street
Seagoville, Dallas County, Texas

Dear Mr. Zafar:

ECS Southwest, LLP (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Dallas Independent School District (DISD) during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during the construction phase operations as well to verify subsurface conditions determined for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS Southwest, LLP



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EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

- The planned development consists of single-story building addition to the existing elementary school campus.

- The geotechnical exploration performed for this study consisted of two (2) borings drilled to depths of approximately 5 feet to 50 feet below the existing site grades.

- Based on the borings drilled for the project, the site generally consists of clayey sand, lean clay and fat clay underlain by the gray shale. Below the soil, gray shale was generally encountered in boring at a depth of 32 feet below the existing grade.

- Groundwater seepage was not observed during drilling operations nor at the completion of drilling.

- The potential vertical movement (PVM) of the site is estimated to be about 1 to 2 inches. The subgrade should be prepared to reduce movements. Details on addressing these expansive clay soils are presented in the body of the report.

- The planned structure can be supported on drilled straight shaft piers bearing in gray shale or drilled underreamed piers bearing in soil. Details on addressing the foundation are presented in the body of the report.

- It is recommended that ECS conduct a geotechnical review of the project plans (prior to issuance for construction) to check to see that ECS' geotechnical recommendations have been properly interpreted and implemented.

- To prevent misinterpretation of ECS recommendations, ECS should be retained to perform quality control testing and documentation during construction of the earthwork and foundations for the project.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design and construction of the planned development to be located at 304 N Kaufman Street, Seagoville, Dallas, Texas. The recommendations developed for this report are based on project information provided by the client.

Our services were performed in general accordance with ECS Proposal No. 19:17057-GP (Revised), dated February 12, 2026, as authorized by the client on March 2, 2026, by signing the Assignment of Work, Master Service Agreement.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items.

- A brief review and description of our field and laboratory test procedures and the results of testing conducted.
- A review of surface topographical features and site conditions.
- A review of area and site geologic conditions.
- A review of subsurface soil stratigraphy with pertinent available physical properties.
- Final soil exploration boring logs.
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills.
- Recommended foundation types.
- General recommendations for pavement design.

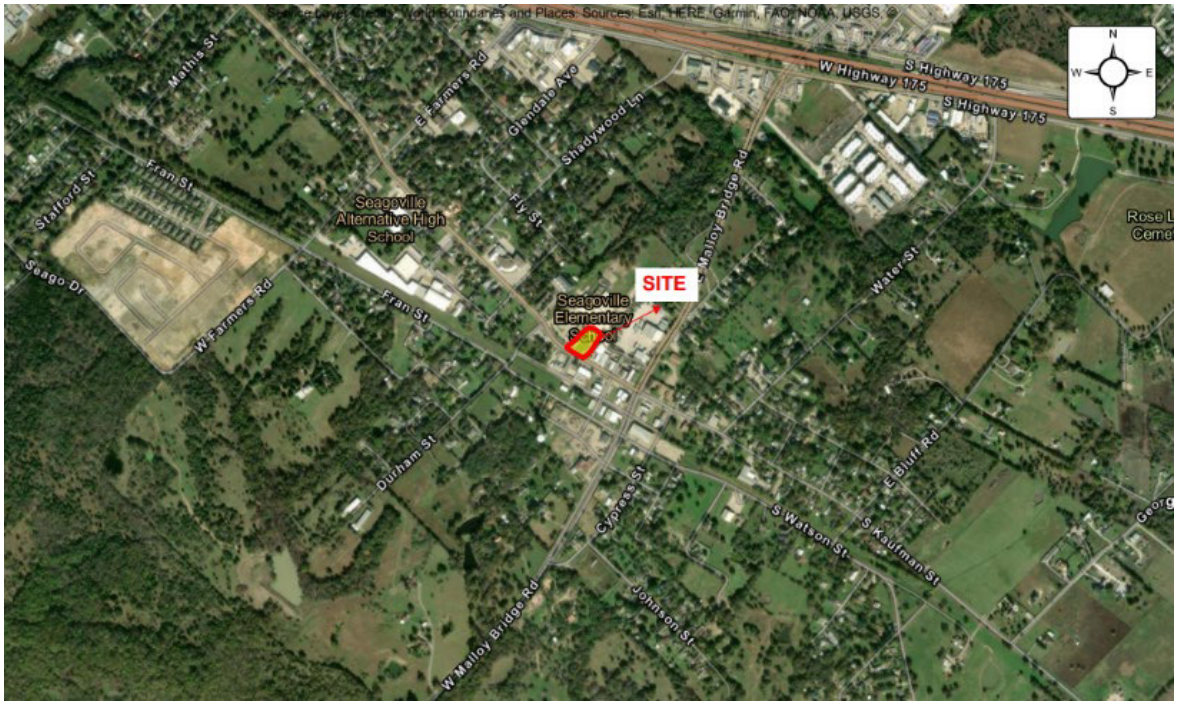
2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION/CURRENT SITE USE

The project site is located at 304 N Kaufman Street in Seagoville, Texas. Based on aerial images and our site visit, the site is an undeveloped vacant grass-covered field.

The site generally slopes down from southeast to northwest with approximate elevations of EL+444 to EL +442 feet respectively. The ground surface elevations noted in this report were obtained from NCTCOG (www.dfwmaps.com), which provided elevation contours in 2 feet intervals.

The project location is depicted in the following image.



2.2 PROPOSED CONSTRUCTION

The following information explains our understanding of the planned development including the proposed building and related infrastructure.

SUBJECT	DESIGN INFORMATION / ASSUMPTIONS
Building Footprint	8,500 GSF single story building addition to the existing approximately 64,000 SF elementary school campus.
# of Stories	1 story above grade
Usage	Educational / Institutional (The new addition will provide facilities for science lab, music, and special education.)
Building Loads	Column: 100 kips to 300 kips Wall: 1 kip/ft to 3 kip/ft Slab: 100 psf to 250 psf
Grading (assumed)	2 feet near the existing grades

If ECS' understanding of the project is not correct please contact ECS so that we may review these changes and revise our recommendations, as appropriate.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field and laboratory data to assist in the determination of geotechnical recommendations.

The subsurface conditions were explored by drilling a total of two (2) borings to depths of about 5 feet and 50 feet below the existing site grades. A truck-mounted drill rig with continuous flight augers (CFA) was utilized to drill the borings.

Our borings were located with a handheld GPS unit and their approximate locations are shown on the Boring Location Diagram in Appendix A. The ground surface elevations noted in this report were obtained from NCTCOG (www.dfwmaps.com), which provided elevation contours in 2 feet intervals.

Representative soil samples were obtained by means of Shelby tube sampling procedures in accordance with ASTM Specification D-1587. In the Shelby tube sampling procedure, a thin walled, steel, seamless tube with sharp cutting edges is pushed hydraulically into the soil, and a relatively undisturbed sample is obtained.

Texas Cone Penetrometer tests were performed to evaluate the load carrying capacity of the rock encountered. These tests were performed in general accordance with test method Tex-132-E in the Texas Department of Transportation (TxDOT) Manual of Testing Procedures. The results of these tests are shown on the attached boring log at the depths of occurrence.

Field logs of the soils encountered in the borings were maintained by the drill crew. After recovery, each geotechnical soil sample was removed from the sampler and visually classified. Representative portions of each soil sample were then wrapped in plastic and transported to our laboratory for further visual examination and laboratory testing. After completion of the drilling operations, the boreholes were backfilled with auger cuttings to the existing ground surface.

3.1 SUBSURFACE CHARACTERIZATION

The regional parent geologic mapping indicates that the site is underlain by the Ozan Formation (lower Taylor Marl) (Ko) geologic formation. The Ozan Formation typically consists of relatively uniform, massive, calcareous shale (commonly referred to as marl). Because marl weathers easily, this rock typically cannot be seen in creek beds or outcrops, and soil is found instead. Upper portions of the “limy” shale can weather into softer, clayey shale.

Through chemical and mechanical weathering, this formation produces highly plastic clay soils. Soil above the marl is typically tan and gray, having a blocky structure. Shallower soils typically have a dark brown to black appearance. These clays can be calcareous with silt and sand content increasing incrementally toward the surface. Glauconitic, phosphate pellets, and hematite and pyrite nodules may appear within the soil matrix.

The location of the site on the geologic map is provided in Appendix A. The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil strata encountered during our subsurface exploration. For specific subsurface information, refer to the boring logs in Appendix B.

Subsurface Stratigraphy

Approximate Depth of Bottom of Strata Below Grade (feet)	Elevation (1) (ft)	Stratum	Material Description	Consistency
13	431	I (2)	(SC) CLAYEY SAND, dark brown, brown, grayish brown, light brown, light gray, moist, with calcareous nodules.	-
5	437	II (3)	CL) LEAN CLAY, brown, reddish brown, light brown, moist.	Hard
32	408	III (4)	(CH) FAT CLAY, light brown, brown, gray, dark gray, moist, with sand, shaley	Hard
50 (6)	394	IV (5)	SHALE, gray	Rock

Notes:

(1) Ground surface elevations were obtained from NCTCOG (www.dfwmaps.com). Please note the elevations provided are approximate ±several feet. Therefore, we recommend the locations be surveyed by a licensed surveyor prior to using in construction.
(2) Stratum I was encountered in all Borings.
(3) Stratum II was encountered in Boring B-01.
(4) Stratum III was encountered in Boring B-02.
(5) Stratum IV was encountered in Boring B-02.
(6) Boring termination depths.

Please refer to the attached boring logs and laboratory data summary for this field exploration for a more detailed description of the subsurface conditions encountered in the borings as the stratification descriptions above are generalized for presentation purposes

3.2 GROUNDWATER OBSERVATIONS

Groundwater level observations were made in the borings during drilling operations. In auger drilling operations, water is not introduced into the borehole and the groundwater position can often be determined by observing water flowing into and out of the excavation. Furthermore, visual observation of soil samples retrieved can often be used in evaluating the groundwater conditions.

Groundwater seepage was not observed during drilling operations or upon the completion of drilling, and is noted as “Dry” on the boring logs.

Variations in the long-term water table may occur because of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors such as the adjacent creek. Any water encountered in borings within this geologic setting, or where man placed fill is present, is generally referred to as a partially perched condition. Specifically, rainfall that enters the site, either directly from overland flow or from adjacent properties, begins to percolate through surficial soils, areas of higher sand concentrations, and/or throughout the fill zones and travels along those interfaces or on top of the rock. This ground water remains trapped, or flow continues downhill with the water table occasionally surfacing to form wet springs and intermittent streams. Water may also perch within and migrate through the clay and gray shale interface, and within cracks and fissures present in the rock strata. Water encountered between the layers of overburden clay and gray shale may be perched and finite but can require aggressive dewatering measures during wet periods and has the potential for high flow concentrations, particularly if hydraulically connected to the adjacent creek.

Only in the lowest lying areas and adjacent to existing creeks is a shallow groundwater table in a continuous condition. The highest groundwater observations are normally encountered in the late winter and early spring. Therefore, the groundwater conditions at this site are expected to be significantly influenced by surface water runoff and rainfall and the normal operating level of the adjacent creek.

3.3 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples. Testing performed includes moisture content, Atterberg limits, percent passing No. 200 sieve, overburden swell, and unconfined compressive strength.

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

The soil samples will be retained in our laboratory for a period of 60 days, after which, they will be discarded unless other instructions are received as to their disposition.

4.0 DESIGN RECOMMENDATIONS

The following recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions. If there are any changes to the project characteristics or if different subsurface conditions are encountered during construction, ECS should be consulted so that the recommendations of this report can be reviewed. Grading information was not available at the time of this report. Therefore, we have assumed the proposed addition will match the floor level of the existing building.

4.1 POTENTIAL VERTICAL MOVEMENTS

The recommendations contained in this report are provided to reduce the potential risk associated with the shrink/swell tendencies of the on-site expansive soil, occurring seasonally, throughout the life of the building with the changes in moisture content. Based on test method TEX-124-E in the Texas Department of Transportation (TxDOT) Manual of Testing Procedures, and our experience with similar soils, we estimate potential vertical soil movements (PVM) will be about 1 to 2 inches, based on dry conditions. The actual movements could be greater if poor drainage, ponded water, and/or other unusual sources of moisture are allowed to saturate the soils beneath the structure after construction.

4.2 SUBGRADE IMPROVEMENTS

In order to achieve a uniform PVM and minimize the risk associated with future movements, we recommend the subgrade under the proposed marquee addition be improved to reduce the PVM to one inch or less for the on-grade structures.

PROPOSED SUBGRADE IMPROVEMENT			
Depth of Select Fill/Flexible base	**Depth of Moisture Conditioning**	**Total Depth of Improved Zone**	**PVM**
1 foot	2	3	1-inch

The subgrade improvements should extend at least 5 feet beyond the edge of the foundation pad and include any flatwork sensitive to movements such as sidewalks or pavements. Exterior grade beam backfill should consist of on-site moisture conditioned clay. Any fill used to achieve the final grade within the foundation pad area should be placed as moisture conditioned fill as recommended in the Section "Moisture Conditioned Fill".

Positive drainage should be provided away from the structures and with moderate irrigation of surrounding lawn and planter areas with no excessive wetting or drying of soils adjacent to the foundations. Greater potential movements could occur with extreme wetting or drying of the soils due to ponding of water, plumbing leaks or lack of irrigation. Recommendations for earthwork operations are found in the "Site Construction Recommendations" portion of this report.

4.3 FOUNDATIONS

The site generally consists of lean and fat clays underlain by gray shale. Below the soil, gray shale was generally encountered at a depth of 32 feet below the existing grades. The following table summarizes the depth/elevation to/at the top of gray shale encountered at boring locations.

DEPTH/ELEVATION TO/AT THE TOP OF GRAY SHALE				
Boring No.	**Boring Depth (ft.)**	**Elevation at the Top of Boring (ft.)[1]**	**Depth to Gray Shale (ft.)**	**Elevation at the Top of Gray Shale (ft.)[1]**
B-02	50	444	32	408

Notes: [1] – Please note that the ground surface elevations were not surveyed by a licensed surveyor; these elevations are approximate based on NCTCOG (www.dfwmaps.com) which provided elevation contours in two-foot intervals.

The foundation approaches would consist of a deep foundation with an improved subgrade for the proposed on-grade structure. Straight drilled shafts bearing in gray shale or drilled underreamed shafts bearing in clay soils can be used to support the planned marquee addition.

It is important that the foundation be designed based on the subsurface conditions encountered in the marquee area and potential movement from the clay soils under the foundation pad. The following sections provide recommendations for foundation design, slab, and seismic design parameters.

4.3.1 Drilled Straight Shafts – Design Parameters

The recommended design parameters for drilled straight shafts are presented in the following table:

DESIGN PARAMETERS FOR STRAIGHT DRILLED SHAFTS	
Parameter	**Recommendations**
Acceptable Bearing Material (1)	Gray Shale
Minimum Embedment Depth	5 feet
Net allowable end bearing capacity (1) (psf)	30,000
Net Allowable skin friction in compression (2) (psf)	5,000
Net Allowable skin friction in tension (2) (psf)	3,000
Reduction in skin friction due to two closely located shafts	No reduction is required for straight drilled shafts with center-to-center spacing of 2.5 times diameter of larger shaft. For closely spaced shafts, the design skin friction varies linearly from the full value at 2.5 times diameters to 50% of the design value at 1.0 times shaft diameter.
Groups of 3 or more shafts spaced closer than 2.0 times shaft diameter	Should be evaluated by ECS. Alternative installation sequences will be required to allow for a minimum of 48 hours of concrete curing time, prior to installation of adjacent shafts.
Soil induced uplift (3)	1,200 psf acting over the shaft perimeter for a depth of 10 feet.
Settlement (4)	Approximately 1 inch.
Minimum shaft diameter (5)	18 inches

Notes:

(1) Drilled pier installation should be observed by ECS to verify that proper bearing material is encountered, and minimum embedment is achieved.
(2) The skin friction should be applied to that portion of the drilled shafts in direct contact with the bedrock below any temporary casing.
(3) The drilled shafts will be subjected to uplift due to swelling of the expansive clays in contact with the drilled shafts. The drilled shafts must be designed with adequate embedment depth to resist uplift forces and should reinforced with sufficient, full-depth, vertical reinforcing steel to resist uplift forces.
(4) Settlement will primarily be within the elastic range with a portion of settlement occurring during construction.
(5) Assumes the pier is designed with adequate reinforcing steel.

4.3.2 Drilled and Underreamed (Belled) Shafts – Axial Design Parameters

The proposed structure may also be supported by underreamed drilled shafts bearing in the clay soils. Axial design parameters for drilled and underreamed shafts are presented in the following table.

AXIAL DESIGN PARAMETERS FOR DRILLED AND UNDERREAMED SHAFTS	
Parameter	**Recommendations**
Bearing stratum	Overburden Natural Lean Clay Soils
Bearing depth below finished grade	15 feet and extend through any existing fill (if encountered)
Top of Bell	Top of bell should be at least 2 foot below the bottom of any existing fill (if encountered) or subgrade improvements

AXIAL DESIGN PARAMETERS FOR DRILLED AND UNDERREAMED SHAFTS	
Parameter	**Recommendations**
Net allowable end bearing capacity	4,000 psf
Minimum shaft diameter(3)	18 inches
Minimum bell diameter	36 inches larger than the straight portion
Minimum bell to shaft diameter ratio	2 to 1
Maximum bell to shaft diameter ratio	3 to 1
Minimum bell edge to bell edge spacing	One bell diameter, based on the larger of the two bells
Soil induced uplift[1]	1,200 psf acting over the shaft perimeter for a depth of 10 feet.
Total settlement[2]	½ to 1 percent of the bell diameter
Differential settlement[2]	50 to 75 percent of the total settlement

Notes:

(1) The drilled shafts will be subjected to uplift due to swelling of the expansive clays in contact with the drilled shafts. The drilled shafts must be designed with adequate embedment depth to resist uplift forces and should be reinforced with sufficient, full-depth, vertical reinforcing steel to resist uplift forces.

(2) Settlement will primarily be within the elastic range, with a portion of settlement occurring during construction.

(3) The pier should be designed with adequate reinforcing steel.

4.3.3 Drilled Shafts – Lateral Design Considerations

Deep foundations may be subject to lateral loads. For the lateral design consideration, we are providing the following unfactored maximum information that can be used in ENSOFT's LPILE computer program:

LATERAL DESIGN VALUES – SOIL					
Description	**LPile Material Type**	**Unit Weight, (pcf)**	**Undrained Shear Strength, (psf)**	**Friction Angle, (degrees)**	**E50**
Top 3 feet	Ignore	Ignore	Ignore	-	Ignore
Soils below 3 feet	Stiff Clay without Free Water (Reese)	125	1,250	-	0.005

LATERAL DESIGN VALUES – ROCK						
Description	**LPile Material Type**	**Unit Weight (pcf)**	**Uniaxial Compressive Strength, (psi)**	**Elastic Modulus, krm (psi)**	**RQD (%)**	**E50**
SHALE, gray	Weak Rock	130	250	25,000	75	0.0005

4.3.4 Grade Beams or Pier Caps in Conjunction with Drilled Shafts

Grade beams and pier caps (if used) should be physically isolated from the underlying soil surface by a void space and be structurally supported by the drilled shafts. A minimum void space of 8 inches should be provided beneath the grade beams.

The purpose of the void is to provide space for swelling of expansive subsurface materials without resulting in structural distress to the grade beam. Structural cardboard carton forms are often used to provide this void beneath grade beams. Soil retainers (void form skirt) are further recommended to minimize the potential for infilling of the void space over time after carton forms deteriorate.

Cardboard void forms must have sufficient strength to support the weight of the grade beam during construction. The excavation in which the void box lays must remain dry. Care must be exercised during construction to prevent collapse of these cartons. Backfill material must not be allowed to enter the void carton area below the grade beams, since this reduces the void space in which the underlying soils need to swell.

Soils placed along the exterior of the grade beams should be on-site clay soils placed and compacted to at least 95% of the Maximum Dry Density at a minimum of +3 percentage points above optimum moisture content as obtained using the Standard Proctor Method (ASTM D-698). The purpose of this clay backfill is to reduce the opportunity for surface or subsurface water infiltration beneath the structure. The backfill should be about two feet deep or deeper.

4.3.5 On-Grade Slab in Conjunction with Drilled Shafts

If the slab is designed to tolerate movements of about 1 inch, it can be supported on grade provided the subgrade is prepared to achieve 1 inch movement as discussed in the Section *"Subgrade Improvements"*. The following are some of soil-supported slab recommendations:

Subgrade Modulus: Provided subgrades are prepared as, discussed herein, the slab may be designed assuming a modulus of subgrade reaction, k_1 of 100 pci (lbs./cu. inch).

Joints: Adequate construction joints, contraction joints and isolation joints should also be provided in the slab to reduce the impacts of cracking and shrinkage. Please refer to ACI 302.1R96 Guide for Concrete Floor and Slab Construction for additional information regarding the concrete slab joint design.

4.3.6 Structural Floor Slabs

In lieu of providing any subgrade improvements, the building slabs can be structurally suspended either using a crawl space or void cartons. If void cartons are used, then they should be at least 12 inches deep, beneath the slab and all grade beams.

If a crawl space is provided below the floor slabs, adequate ventilation should also be provided. Additionally, if a crawl space will be primarily below the level of existing grade, a vertical moisture barrier should be considered around the perimeter of the structures. Adequate drainage should be provided should standing water infiltrate underneath the slabs.

The subgrade beneath the crawl space should be graded to remove water from beneath the structure. If using gravity alone to drain the water from beneath the structure is not adequate, it may be necessary to direct the underfloor drainage ditches to a sump pump. Construction must also contain sufficient ventilation to limit corrosion of the metal components.

As previously noted, the PVM of the site is on the order of 1 to 2 inches. If a mud mat or lean concrete is placed at or near the existing subgrade elevation within the crawlspace, the mat will be subjected to the same PVM. Even with smaller amounts of vertical movement, distress to the mud mat should be anticipated. Further, the vertical movement over time may prohibit adequate drainage. Periodic and routine maintenance of the mud mat should be expected and performed

such as sealing cracks that may develop or repairing sections that prevent proper drainage from the vertical movement experienced.

If crawl space is utilized, we recommend that the floor slab be suspended at least 12 inches above final subgrade elevations. If utility lines are suspended beneath the slab, the crawl space clearance should be increased to a minimum of 2 feet to provide access to these lines.

Future movements of soil supported utility lines must be considered when designing connections, especially where these lines approach or enter the stationary structure. In addition, plumbing lines should be isolated from the soil to reduce plumbing line movements. Suspending the plumbing lines beneath the slab or the commercially available Mudskipper system or similar methods can be used to isolate plumbing lines from soil.

4.4 BUILDING PERIMITER CONDITIONS

Soils placed along the exterior of any grade beams should the most fine-grained soils available placed and compacted in accordance with this report. The purpose of this backfill is to reduce the opportunity for surface or subsurface water infiltration beneath the structures. Where granular fill is used, the overbuild zone should be removed outside of the perimeter grade beams and backfilled with onsite clay.

We recommend paving/sidewalks be placed adjacent to the structures to reduce seasonal drying of the moisture-conditioned soils near the perimeter of the structures. Irrigation of lawn and landscaped areas should be moderate, with no excessive wetting or drying of soils around the perimeter of the structures allowed. Positive drainage away from the structures should also be provided. Trees and bushes/shrubs planted near the perimeter of the structures can withdraw large amounts of water from the soils and should be planted at least their anticipated mature height away from the buildings.

If vegetation is planted closer than the anticipated mature height away from the buildings, then a root barrier should be installed in accordance with the manufacturer's specifications.

Any penetrations into the buildings should be backfilled and sealed as shown on the "Clay Plug Detail" provided in the Appendix of this report. Utilities should be equipped with a flexible connection to minimize the differential movement between the utility line and the building.

Routine maintenance is required to ensure that the recommendations contained in this report are followed and maintained. Greater potential movements could occur with extreme wetting or drying of the soils due to poor drainage, ponding of water, plumbing leaks, lack of irrigation, and/or lack of routine maintenance, etc.

4.5 SEISMIC DESIGN CONSIDERATIONS

Seismic Site Classification: The International Building Code (IBC) requires site classification for seismic design based on the upper 100 feet of a soil profile. At least two methods are utilized in classifying sites, namely the shear wave velocity (v_s) method and the Standard Penetration Resistance (N-value) method. The Standard Penetration Resistance (N-value) method was used in classifying this site.

SEISMIC SITE CLASSIFICATION				
Site Class	**Soil Profile Name**	**Shear Wave Velocity, Vs, (ft./s)**	**N value (bpf)**	**S_u (psf)**
A	Hard Rock	Vs > 5,000 fps	N/A	N/A
B	Rock	2,500 < Vs ≤ 5,000 fps	N/A	N/A
C	Very dense soil and soft rock	1,200 < Vs ≤ 2,500 fps	>50	$s_u \geq$ 2,000
D	Stiff Soil Profile	600 ≤ Vs ≤ 1,200 fps	15 to 60	1,000 ≤ s_u ≤ 2000
E	Soft Soil Profile	Vs < 600 fps	<15	s_u < 1000

Based upon our interpretation of the subsurface conditions, the appropriate Seismic Site Classification is "C" as shown in the preceding table.

Ground Motion Parameters: In addition to the seismic site classification, ECS has determined the design spectral response acceleration parameters following the IBC methodology. The Mapped Reponses were estimated from the USGS website. The design responses for the short (0.2 sec, S_{DS}) and 1-second period (S_{D1}) are noted at the far-right end of the following table.

GROUND MOTION PARAMETERS [IBC METHOD]								
Period (sec)	**Mapped Spectral Response Accelerations (g)**		**Values of Site Coefficient for Site Class**		**Maximum Spectral Response Acceleration Adjusted for Site Class (g)**		**Design Spectral Response Acceleration (g)**	
Reference	Figures 1613.3.1 (1) & (2)		Tables 1613.3.3 (1) & (2)		Eqs. 16-37 & 16-38		Eqs. 16-39 & 16-40	
0.2	S_S	0.095	F_a	1.2	$S_{MS}=F_aS_s$	0.113	$S_{DS}=2/3\ S_{MS}$	0.076
1.0	S_1	0.052	F_v	1.7	$S_{M1}=F_vS_1$	0.089	$S_{D1}=2/3\ S_{M1}$	0.059

The Site Class definition should not be confused with the Seismic Design Category designation which the Structural Engineer typically assesses. If a higher site classification is beneficial to the project, we can provide additional testing methods that may yield more favorable results.

4.6 PAVEMENT SECTIONS

Portland cement concrete pavement can be considered for this site. Lime stabilization is recommended beneath Portland cement concrete pavements. If lime stabilization is considered, we recommend testing the soils for soluble sulfate during construction. We should be contacted to evaluate the feasibility of lime stabilization.

Typical preliminary pavement sections are provided below. The Standard Duty and Medium Duty concrete pavements with lime stabilization are adequate for design life of 50,000 and 125,000 ESAL, respectively. In some cases, jurisdictional standards for pavement section construction may exceed those provided below. In that case, the pavement sections should follow the jurisdictional standards.

Material Description	Portland Cement Concrete (PCC) Pavement		
	Standard Duty (Parking)	**Medium Duty (Bus/Fire Lane)**	**Dumpster Area**
Portland Cement Concrete	6 inches (3,000 psi)	8 inches (3,500 psi)	7 inches (3,500 psi)
Subgrade (1,2)	8 inches Lime Stabilized	8 inches Lime Stabilized	8 inches Lime Stabilized

Notes:
(1) Flexible base materials may be substituted with lime stabilization at an equivalent thickness substitution.
(2) In lieu of lime stabilization, the concrete thickness may be increased by one (1) inch.

Pavement should be specified, constructed, and tested to meet the following requirements:

1. Reinforcing Steel: #4 reinforcing steel bars placed at 18 inches on center each way mid-point of the pavement section thickness.
2. Portland Cement Concrete: Minimum compressive strength of 4,000 lbs per sq inch at 28 days. Concrete should be designed with 3 to 6% entrained air.
3. Flexible Base Material: Item 247 of the TxDOT Standard Specifications, Type D, Grade 1 or 2.

Drainage: An important consideration with the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade, and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should reduce the possibility of the subgrade materials becoming saturated during the normal service period of the pavement.

Joints: Proper joint placement and design is critical to pavement performance. Load transfer at all joints and maintenance of watertight joints should be accomplished by use of proper joint seals and dowels. Control joints in new pavement should be sawed as soon as practical and preferably within 5 to 12 hours after placing concrete in order to control the location of cracks which form as the concrete cures. Longitudinal and transverse control joints should be sawed at about 15-foot spacing. Joints should be properly cleaned and sealed as soon as possible to avoid infiltration of water, small gravel, etc.

Lime Stabilization: For lime stabilization, a preliminary lime application rate of 7% (42 lbs/SY) hydrated lime by dry weight of clay can be used for budgeting purposes. The actual amount of lime required should be confirmed by additional laboratory tests (lime series) during the construction phase. The lime stabilized clay should be thoroughly mixed and appropriately mellowed for at least 48 hours and tested for gradation and lime solubility (pH) prior to final placement and compaction. The actual amount of lime required should be confirmed by additional laboratory tests (lime series) during the construction phase which should include testing for the presence of soluble sulfates, once the final grading is established.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

In a dry and undisturbed state, the upper 1-foot of the majority of the soil at the site will provide good subgrade support for fill placement and construction operations. However, when wet, this soil will degrade quickly with disturbance from contractor operations. Therefore, good site drainage should be maintained during earthwork operations, which would help maintain the integrity of the soil.

The surface of the site should be kept properly graded in order to enhance drainage of the surface water away from the proposed building areas during the construction phase. We recommend that an attempt be made to enhance the natural drainage without interrupting its pattern.

The soils at the site are moisture and disturbance sensitive and contain fines which are considered moderately erodible. Therefore, the contractor should carefully plan his operation to minimize exposure of the subgrade to weather and construction equipment traffic and provide and maintain good site drainage during earthwork operations to help maintain the integrity of the surficial soils. All erosion and sedimentation shall be controlled in accordance with sound engineering practice and current jurisdictional requirements.

5.1.1 Stripping and Grubbing

In preparing the site for paving construction, all loose, poorly compacted existing soils, organic soil (greater than 5% organics), or other unsuitable materials should be removed from the proposed buildings and pavement areas. After stripping the site and prior to placing any fill, all subgrades should be scarified to a minimum depth of 6 inches; moisture conditioned and compacted to at least 95% of Maximum Dry Density as obtained by the Standard Proctor Method (ASTM D-698) above the optimum value.

5.1.2 Proofrolling

After stripping and removing all unsuitable surface materials, cutting to the proposed grade, and prior to the placement of any structural fill, the exposed subgrade should be examined by the Geotechnical Engineer or authorized representative. The exposed subgrade should be thoroughly proofrolled with previously approved construction equipment having a minimum axle load of 10 tons (e.g. fully loaded tandem-axle dump truck). The areas subject to proofrolling should be traversed by the equipment in two perpendicular (orthogonal) directions with overlapping passes of the vehicle under the observation of the Geotechnical Engineer or authorized representative. This procedure is intended to assist in identifying any localized yielding materials. In the event that unstable or “pumping” subgrade is identified by the proofrolling, those areas should be marked for repair prior to the placement of any subsequent structural fill or other construction materials. Methods of repair of unstable subgrade, such as undercutting or moisture conditioning or chemical stabilization, should be discussed with the Geotechnical Engineer to determine the appropriate procedure with regard to the existing conditions causing the instability.
If the area is deemed too small for a piece of equipment to traverse the excavated area it should be thoroughly probed by the Geotechnical Engineer or authorized representative.

It is not necessary to proof-roll the bottom of the building pad subgrade improvements. Once near the bottom of the subgrades, the final 6 to 12 inches may be scarified (in-lieu of excavated) and moisture conditioned in place.

5.1.3 Site Temporary Dewatering

Based upon our subsurface exploration at this site, we believe construction dewatering at this site will be mainly limited to removing accumulated rainwater from low lying areas and some minor seepage.

Temporary sump pits can be used and established at an elevation below the bottom of the excavation subgrade. A perforated 55-gallon drum or other temporary structure could be used to house the pump.

Details of a typical French drainage installation are included in Appendix D. A typical French drain consists of an 18 to 24-inch wide by 18 to 24-inch-deep bed of AASHTO #57 stone wrapped in a medium duty, non-woven geotextile. Actual dimensions should be as determined necessary during construction. After the installation has been completed, the geotextile should be wrapped over the top of the gravel followed by placement of backfill.

5.1.4 Excavation Safety

All excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

5.2 EARTHWORK OPERATIONS

5.2.1 New Planned Fill

New fill should be benched (stepped) into the existing site slopes where the existing slopes are 6H:1V or steeper. For slopes less steep, the subgrade should be scarified prior to the placement of the first lift of soil to ensure a proper bond between existing and new fill. These subgrades should be compacted as outlined below.

All fill should be uniformly undercut, scarified, and/or reworked to receive an adequate amount of water to ensure uniform moisture contents and compaction. Soil moisture levels should be preserved (by various methods that can include covering with plastic, watering, etc.) until new fill, pavements, or slabs are placed. If the soil becomes desiccated, the material should be removed and replaced, or these materials should be scarified, moisture conditioned, and recompacted.

The table below should be used as a summary for the compaction criteria outlined in this report.

Depth Below Finished Grades	Material Type	Compaction Standard (ASTM D-698, Standard)	
		Compaction	Moisture Content
Varies	Select Fill / Flex Base	95%	Above OMC
Varies	Lime Treated Material	95%	+3% above OMC
Building Subgrades	Moisture Conditioned	94%	+3% above OMC
Civil Subgrades to 10 feet	Common Fill	95%	Above OMC
10+ feet All Areas	Common Fill	98%	Above OMC

5.2.2 Backfill Settlement

Special care should be exercised to "tie in" the backfill with adjacent undisturbed, firm, natural soils by providing deep benches into the firm natural soil during placement of each fill lift. Loose materials and "slope wash" that may accumulate in the wall excavation during construction should be completely removed prior to placement of the backfill materials.

Some post-construction settlement of the backfill surface should be anticipated. This is typically on the order of one percent (1%) of the backfill height, even if satisfactory compaction of the backfill materials is achieved. This will lead to potential differential settlement. Therefore, it is recommended that special consideration be given to the design of foundation elements, floor slabs, and pavements that may extend over this backfill because of the potential for differential settlements introduced by this condition.

5.2.3 Earthwork Testing

Field density and moisture tests should be performed on each lift to verify that adequate compaction is achieved. Please use the following table as a guide for the minimum compaction testing requirements.

Location	Testing Frequency (1)	Maximum Lift Thickness (2)
Building Pad	1 test every 2,500 sf	4 inches to 8 inches
Private Pavements	1 test every 5,000 sf	
Utility Backfill	1 test every 150 lf	

Notes:

(1) No less than two tests minimum per lift

(2) 4 inches for hand guided jumping jack or plate tampers, 8 inches for large self-propelled compaction equipment.

Certain jurisdictional requirements may require testing in addition to that noted previously. Therefore, these recommendations should be reviewed, and the more stringent specifications should be followed.

5.2.4 Material Specifications

Material Name	Plasticity Requirement	Soil Gradation Requirement	Maximum Particle Size
Moisture Conditioning	PI of 35 or less	Any	6 inches
Common Fill	PI of 35 or less	Any	

Material Name	Plasticity Requirement	Soil Gradation Requirement	Maximum Particle Size
Select Fill	PI of 18 or less	40% to 70% Passing 200	
Flexible Base (Natural or Recycled)	TxDOT Item 247, Type D, Grade 1 or 2		
Natural Free Draining	ASTM C33 No. 57 or No. 67		

Lime Stabilized Clay: Lime stabilized clay may be used as pavement subgrades for stabilization or as a protective cap over moisture conditioned clays or other fill. A preliminary lime application rate of 7% hydrated lime by dry weight of clay (TxDOT Item 260) should be used for budgeting purposes. The actual amount of lime required should be confirmed by additional laboratory tests (lime series) during the construction phase, which should include testing for the presence of soluble sulfates, once the final grading is established.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Drilled Shafts: The drilled shafts should be installed in accordance with American Concrete Institute's "Standard Specification for the Construction of Drilled Piers" (ACI 336). Recommendations provided in this report are based on proper construction procedures including maintaining a dry shaft excavation. We recommend that all drilled shafts be observed by qualified geotechnical personnel, to verify proper shaft installation. Observations should include:

1. identification of the bearing stratum;
2. minimum penetration depth;
3. removal of all smear zones and cuttings;
4. correct handling of groundwater seepage;
5. shafts are within acceptable vertical tolerance; and
6. other related items

Groundwater seepage was not observed during and after drilling in the boring but could be encountered during installation of the drilled and underreamed shafts, particularly if construction proceeds during a wet period of the year. If groundwater is encountered during drilled and underreamed shaft installation, the drilled shafts can be raised slightly to stay above the groundwater. ECS should be contacted if drilled shafts are raised more than 2 feet.

The concrete should have a slump between 5 and 7 inches and should be placed in a manner that prevents it from striking the reinforcing steel and sides of the excavation. Concrete placed in an excavation more than 10 feet should be placed in such a manner (using a tremie, centralizing chute, or by similar means) to prevent segregation of aggregates or to prevent concrete from striking the reinforcing steel. The concrete in the upper five feet of the shaft should be mechanically consolidated. Drilled and underreamed shafts should be excavated and concreted on the same day.

Care should be taken to avoid creating an oversized cap ("mushroom") near the ground surface. A "mushroom" at the top of the drilled shaft could be lifted by expansive soils. Pier caps extending outside the nominal pier diameter (if used) should be constructed over void forms to reduce the potential for additional uplift forces.

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore,

foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. Footing subgrades should be evaluated with a DCP prior to the placement of concrete to confirm that the bearing soils are what was anticipated.

Slab Subgrade Verification: Prior to placement of a poly vapor barrier, the subgrade should be prepared in accordance with the recommendations found in **Section 5**.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Loose or unsuitable materials encountered should be removed and replaced with suitable compacted Select Fill, or pipe stone bedding material.

Utility Backfilling: The granular bedding material (often AASHTO #57 stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the spring line of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Select Fill and Fill Placement.

6.0 CLOSING

ECS has prepared this report of findings, evaluations, and recommendations to guide geotechnical-related design and construction aspects of the project. In fulfilling our obligations and responsibilities, as listed in the proposal, we performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation expressed or implied, and no warranty or guarantee is included or intended in this report. ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

The description of the proposed project is based on information provided to ECS by the project design team. If any of this information is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so that we can review the report in light of the changes and provide additional or alternate recommendations as may be required.

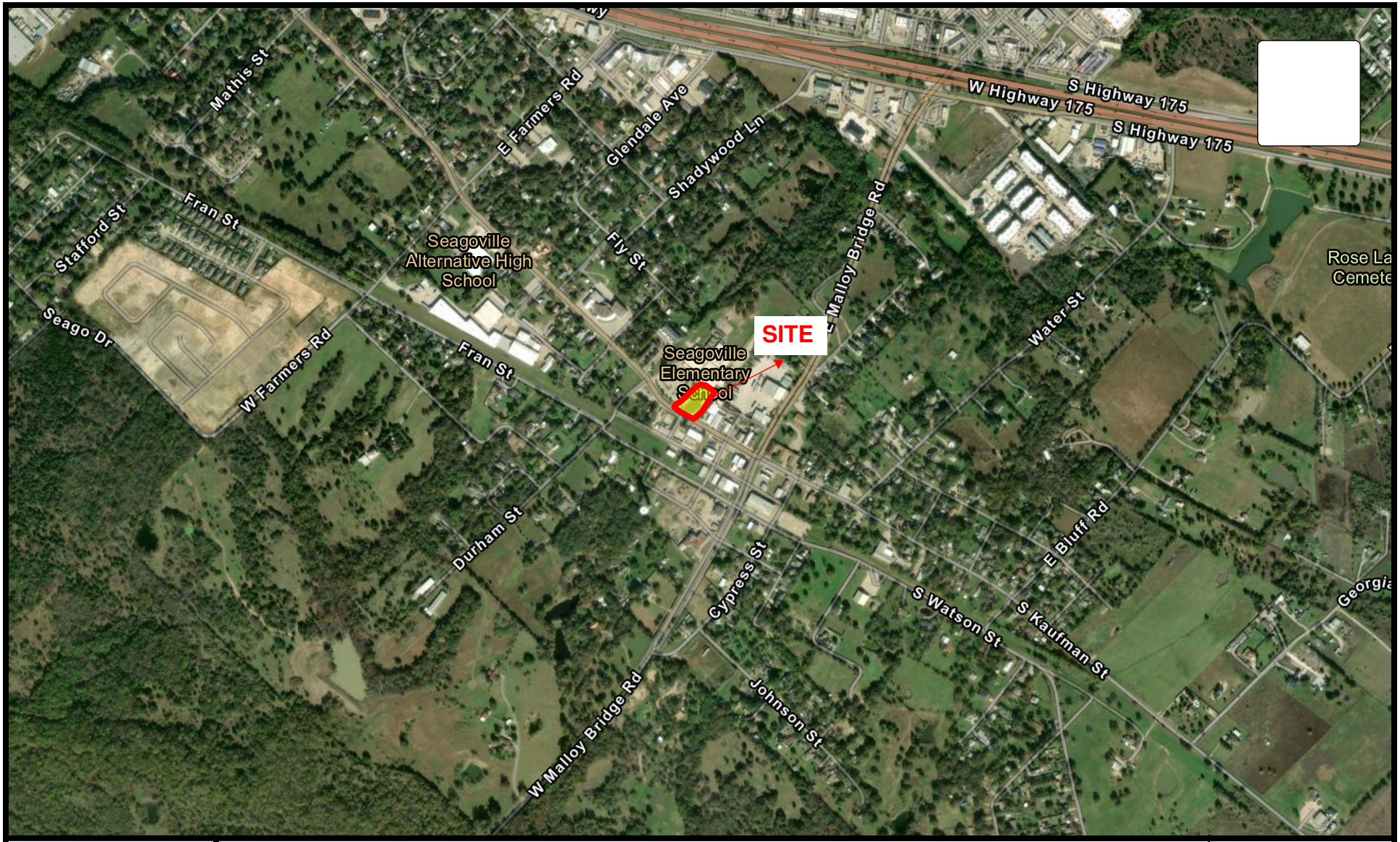
We recommend that ECS review the project's plans and specifications so that we may evaluate those plans/specifications with the intent of the geotechnical report.

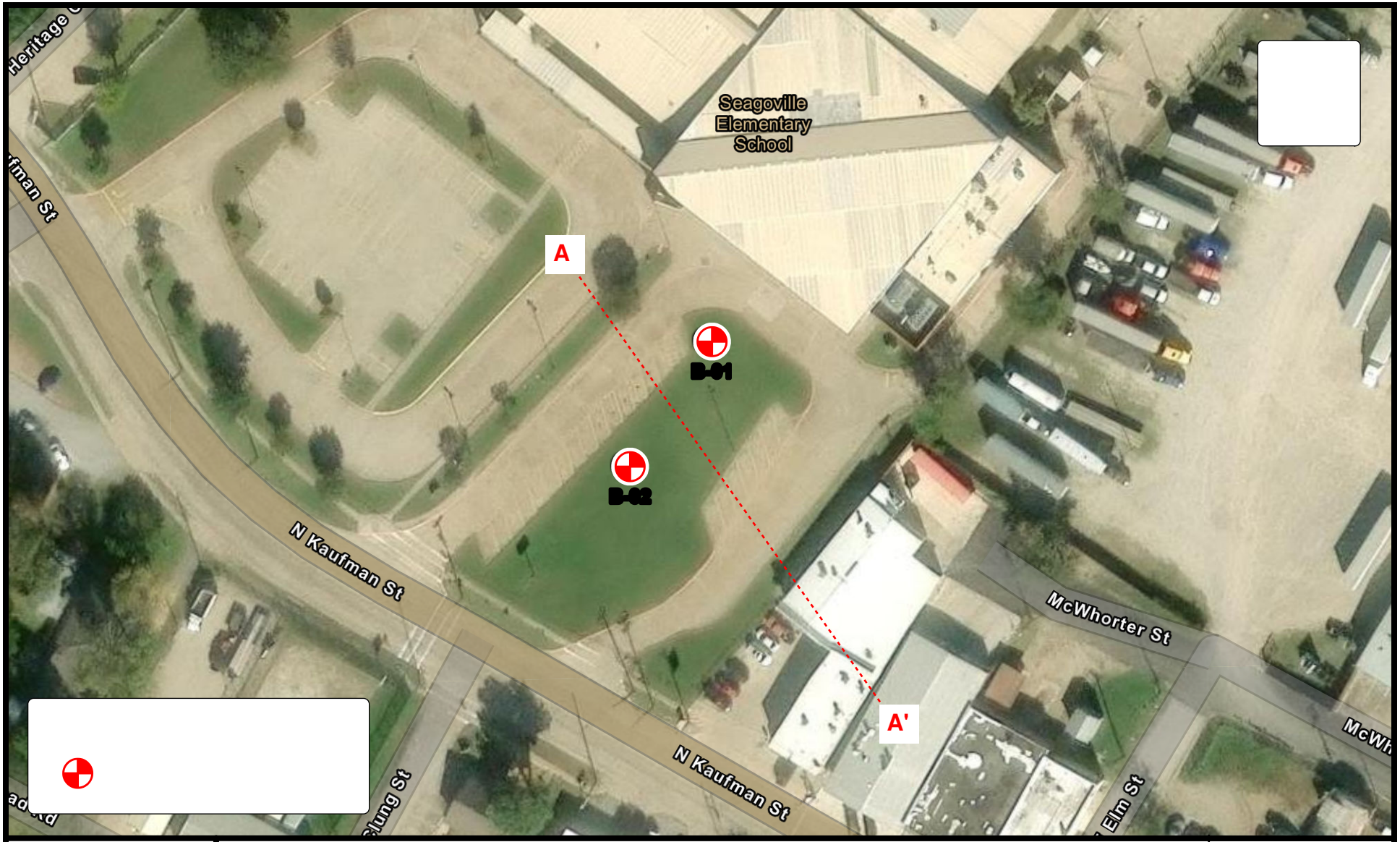
Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendations. We recommend that the Owner retain ECS throughout construction.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

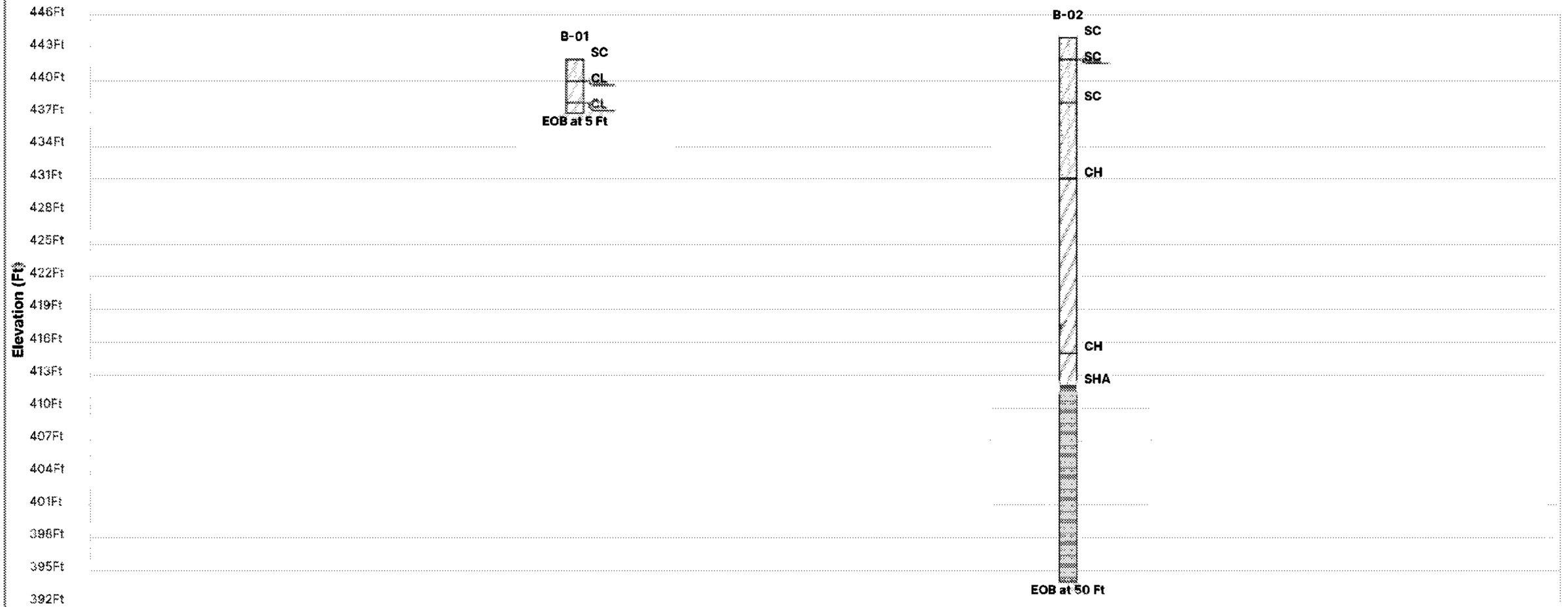
Appendix A - Drawings and Reports

Site Location Diagram
Boring Location Diagram(s)
Subsurface Cross-Section(s)
Geologic Survey Map


SITE
Seagoville Elementary School
Seagoville Alternative High School
Mathis St
E Farmers Rd
Glendale Ave
Shadywood Ln
W Highway 175
S Highway 175
S Highway 175
Malloy Bridge Rd
Stafford St
Fran St
Fly St
Seago Dr
W Farmers Rd
Fran St
Water St
Durham St
Cypress St
E Bluff Rd
S Watson St
S Kaufman St
Johnson St
W Malloy Bridge Rd


Seagoville Elementary School
A
A'
B-01
B-02
N Kaufman St
N Kaufman St
McWhorter St
Elm St

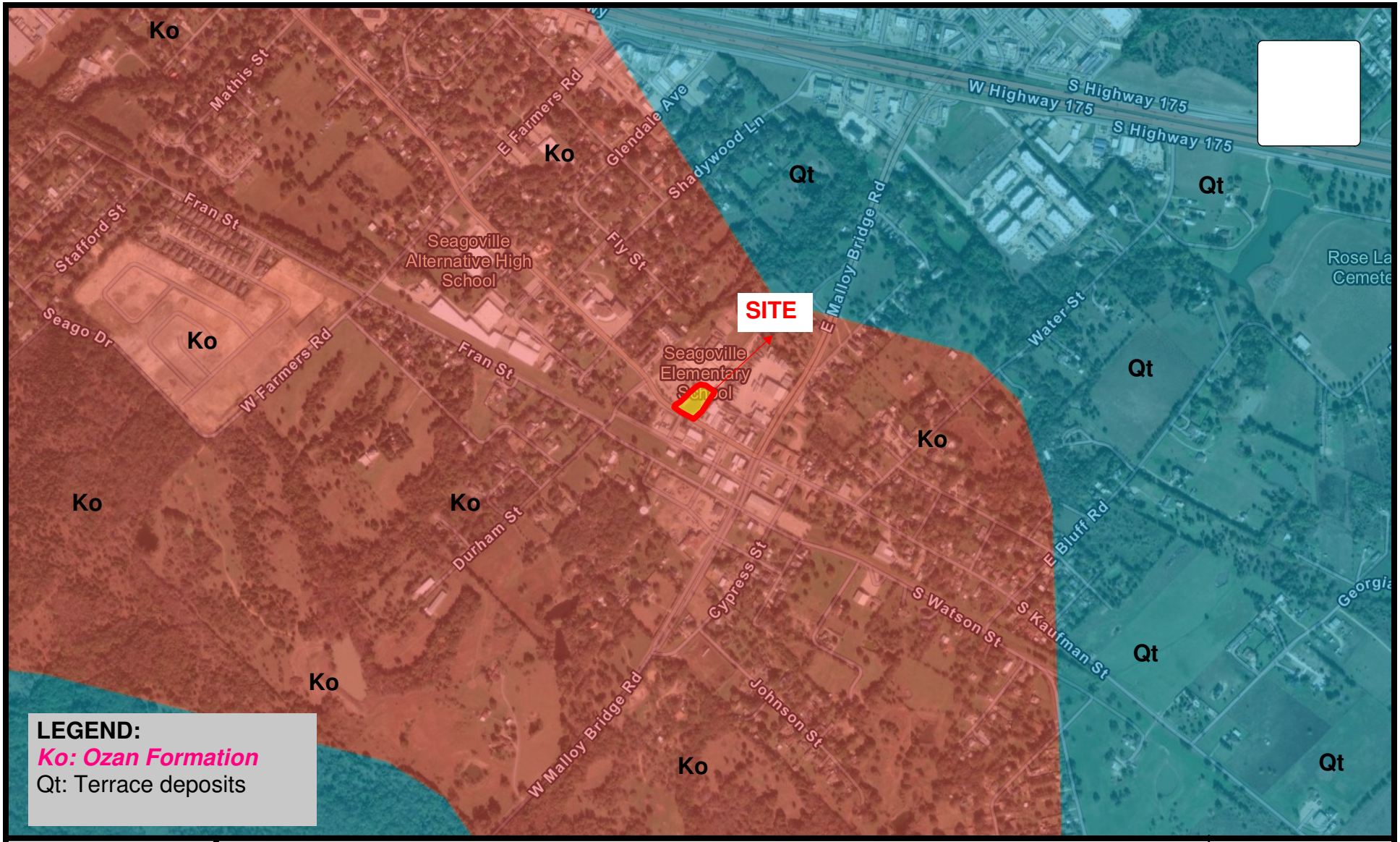
Subsurface Cross Section A-A'



CLIENT:	Dallas Independent School District	PROJECT:	Seagoville ES Renovation (ORG 208)
DRAWN DATE:	Mar 12, 2026	PROJECT NO.:	19:10333
CHECKED DATE:	Mar 12, 2026	SCALE:	AS SHOWN

Notes
1-EOB: END OF BORING AP: AUGER REFUSALSR: SAMPLER REFUSAL
2-SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
3-STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586)
4- TOPOGRAPHIC INFORMATION IS BASED ON PUBLICLY AVAILABLE DATA (GOOGLE OR CESIUM) THE TOPOGRAPHIC LINE SHOWN BETWEEN BORINGS IS FOR VISUAL REFERENCE ONLY PLEASE REFER TO THE REFERENCE NOTES FOR BORING LOGS FOR SYMBOLOGY MEANING AND ADDITIONAL

Plastic Limit Water Content Liquid Limit X—●—△		WL (First Encountered)	Fill
[FINES CONTENT %]		WL (Completion)	Possible Fill
BOTTOM OF CASING		WL (Estimated Seasonal High Water)	Probable Fill
LOSS OF CIRCULATION		WL (Stabilized)	WR/Rock
CALIBRATED PENETROMETER			


Ko
Mathis St
E Farmers Rd
Glendale Ave
Shadywood Ln
W Highway 175
S Highway 175
S Highway 175
Qt
Qt
Stafford St
Fran St
Seagoville Alternative High School
Fly St
E Malloy Bridge Rd
Rose La Cemete
SITE
Seago Dr
Ko
W Farmers Rd
Fran St
Seagoville Elementary School
Water St
Qt
Ko
Ko
Ko
Durham St
E Bluff Rd
Cypress St
S Watson St
S Kaufman St
Georgia
Qt
Ko
W Malloy Bridge Rd
Johnson St
Ko
Qt
LEGEND:
Ko: Ozan Formation
Qt: Terrace deposits

Appendix B - Field Operations

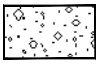
Reference Notes
Boring Logs

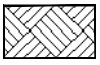
REFERENCE NOTES FOR BORING LOGS

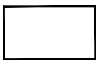
MATERIAL[1,2]

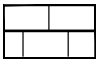

ASPHALT

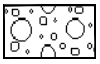

CONCRETE


GRAVEL


TOPSOIL

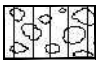

VOID


BRICK

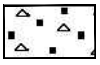

AGGREGATE BASE COURSE

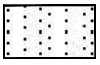

GW **WELL-GRADED GRAVEL**
gravel-sand mixtures, little or no fines

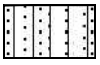

GP **POORLY-GRADED GRAVEL**
gravel-sand mixtures, little or no fines


GM **SILTY GRAVEL**
gravel-sand-silt mixtures

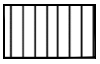

GC **CLAYEY GRAVEL**
gravel-sand-clay mixtures


SW **WELL-GRADED SAND**
gravelly sand, little or no fines


SP **POORLY-GRADED SAND**
gravelly sand, little or no fines


SM **SILTY SAND**
sand-silt mixtures

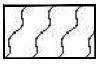

SC **CLAYEY SAND**
sand-clay mixtures


ML **SILT**
non-plastic to medium plasticity

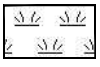

MH **ELASTIC SILT**
high plasticity


CL **LEAN CLAY**
low to medium plasticity


CH **FAT CLAY**
high plasticity


OL **ORGANIC SILT or CLAY**
non-plastic to low plasticity


OH **ORGANIC SILT or CLAY**
high plasticity


PT **PEAT**
highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION		PARTICLE SIZES
Boulders		12 inches (300 mm) or larger
Cobbles		3 inches to 12 inches (75 mm to 300 mm)
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")		<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, Q_P[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective *(ex: "Silty")*	25 - 45	30 - 45

WATER LEVELS[6]

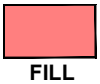

WL (First Encountered)


WL (Completion)


WL (Seasonal High Water)


WL (Stabilized)

FILL AND ROCK


FILL


POSSIBLE FILL


PROBABLE FILL


ROCK

[1]Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2]To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

[3]Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

[4]Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5]Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

[6]The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

[7]Minor deviation from ASTM D 2488-17 Note 14.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

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CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Dallas Independent School District	**19:10333**	**B-01**	**1 OF 1**
PROJECT NAME: **Seagoville ES Renovation (ORG 208)**	DRILLER/CONTRACTOR: **Total Depth Drilling**		
SITE LOCATION: **304 N Kaufman Street, Seagoville, Texas, 75159**			LOSS OF CIRCULATION
LATITUDE: **32.641066486**	LONGITUDE: **-96.539975555**	STRUCTURE:	SURFACE ELEVATION: **442**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT N-VALUE)	LIQUID LIMIT	PLASTICITY INDEX	MOISTUE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)
	S-1	ST	24	24	(SC) CLAYEY SAND - dark brown, moist, with calcareous nodules.								1.5			
	S-2	ST	24	24	(CL) LEAN CLAY - brown , reddish brown, moist, hard.		440			44	26	17.8	4.5			
	S-3	ST	24	24	(CL) LEAN CLAY - brown , light brown, moist, hard.								4.5			
					END OF BORING at 5.0 FT											

Rec % ■ RQD %
0 20 40 60 80 100
SPT ⊗
TCP ▲
0 10 20 30 40 50
ModCal

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	02/27/2026	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	02/27/2026	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Truck	RA	CFA (0'-5')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Dallas Independent School District	**19:10333**	**B-02**	**1 OF 2**
PROJECT NAME: **Seagoville ES Renovation (ORG 208)**	DRILLER/CONTRACTOR: **Total Depth Drilling**		
SITE LOCATION: **304 N Kaufman Street, Seagoville, Texas, 75159**			LOSS OF CIRCULATION
LATITUDE: **32.640870705**	LONGITUDE: **-96.540133479**	STRUCTURE:	SURFACE ELEVATION: **444**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT N-VALUE)	LIQUID LIMIT	PLASTICITY INDEX	MOISTUE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)
	S-1	ST	24	24	(SC) CLAYEY SAND - dark brown, moist.					41	23	8.3	4.0	31.1		
	S-2	ST	24	24	(SC) CLAYEY SAND - brown , grayish brown, moist.		440						3.5			
5	S-3	ST	24	24									3.5			
	S-4	ST	24	24	(SC) CLAYEY SAND - light brown , light gray, moist, with calcareous nodules.					32	18	15.1	3.0	48.7		
	S-5	ST	24	24			435						2.5			
10																
	S-6	ST	24	24	(CH) FAT CLAY - light brown , gray, moist, hard.		430						4.5		101.73	1.64
15																
	S-7	ST	24	24			425						4.5		97.25	1.11
20																
	S-8	ST	24	24			420						4.5		103.36	2.63
25																
	S-9	ST	24	24			415						4.5			
					(CH) FAT CLAY -											

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	03/27/2026	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	02/27/2026	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Truck	RA	CFA (0'-50')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Dallas Independent School District	**19:10333**	**B-02**	**2 OF 2**
PROJECT NAME: **Seagoville ES Renovation (ORG 208)**	DRILLER/CONTRACTOR: **Total Depth Drilling**		
SITE LOCATION: **304 N Kaufman Street, Seagoville, Texas, 75159**			LOSS OF CIRCULATION
LATITUDE: **32.640870705**	LONGITUDE: **-96.540133479**	STRUCTURE:	SURFACE ELEVATION: **444**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT N-VALUE)	Rec % / RQD % / SPT / TCP / ModCal	LIQUID LIMIT	PLASTICITY INDEX	MOISTUE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)
					(CH) FAT CLAY - dark gray, moist, hard, with sand, shaley. (continued)												
					SHALE, Gray.												
							410		50/1.5" 50/1.25" 100/2.75"	100							
35																	
							405		50/1.25" 50/0.75" 100/2"	100							
40																	
							400		50/0.75" 50/0.5" 100/1.25"	100							
45																	
							395		50/0.75" 50/0.5" 100/1.25"	100							
					END OF BORING at 50.0 FT												

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	03/27/2026	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	02/27/2026	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Truck	RA	CFA (0'-50')	

GEOTECHNICAL BOREHOLE LOG

Appendix C - Laboratory Testing

Laboratory Testing Summary

Laboratory Testing Summary

Sample Source	Sample Number	Start Depth (feet)	End Depth (feet)	Sample Distance (feet)	MC[1] (%)	Soil Type[2]	Atterberg Limits[3]			Dry Unit weight (pcf)	Percent Passing No. 200 Sieve[4]	One-Dimensional Swell			Unconfined Compression Strength (tsf)
							LL	PL	PI			Final Moisture (%)	Surcharge (psf)	Swell (%)	
B-01	S-2	2.0	4.0	2.0	17.8	CL	44	18	26	108.0		20.3	380	0.6	
B-02	S-1	0.0	2.0	2.0	8.3	SC	41	18	23	82.4	31.1	30.5	140	0.0	
B-02	S-4	6.0	8.0	2.0	15.1	SC	32	14	18	105.4	48.7	17.2	860	0.2	
B-02	S-6	13.0	15.0	2.0	23.9					101.7					1.6
B-02	S-7	18.0	20.0	2.0	25.8					97.3					1.1
B-02	S-8	23.0	25.0	2.0	22.0					103.4					2.6

Notes: 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index

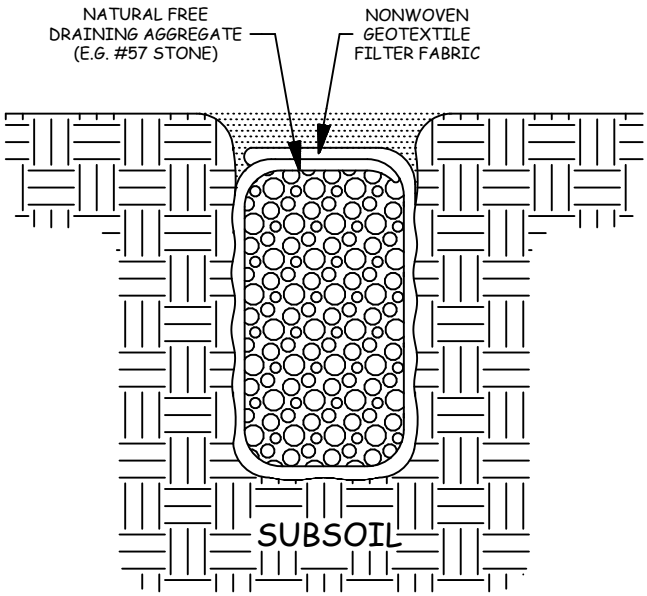
Project No.: 19:10333
Project Name: Seagoville ES Renovation (ORG 208)
PM: Rudaba Adnin
PE: Md Faysal
Printed On: March 15, 2026

ECS Southwest, LLP - Dallas
3033 Kellway Drive, Suite 110
Carrollton, TX 75006
Phone: (972) 392-3222
Fax: (214) 483-9684

Appendix D - Supplemental Documents

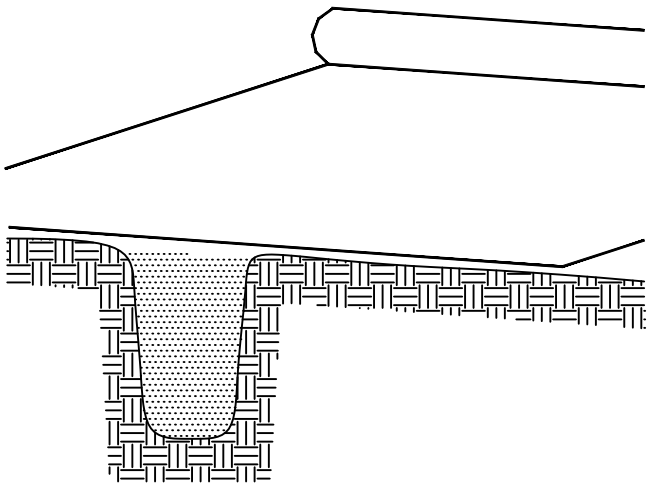
Drawings/Details

FINAL CONFIGURATION



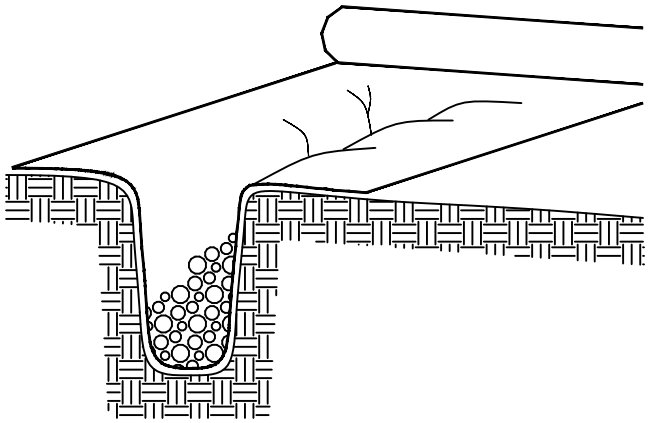
SUBDRAIN USING FILTER FABRIC

STEP 1



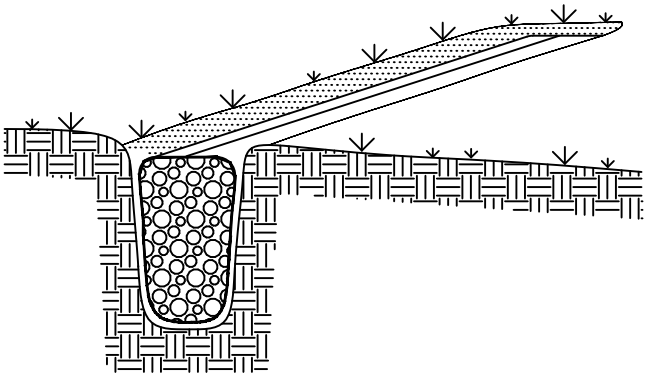
FABRIC IS UNROLLED DIRECTLY OVER TRENCH

STEP 2



THE TRENCH IS FILLED WITH AGGREGATE

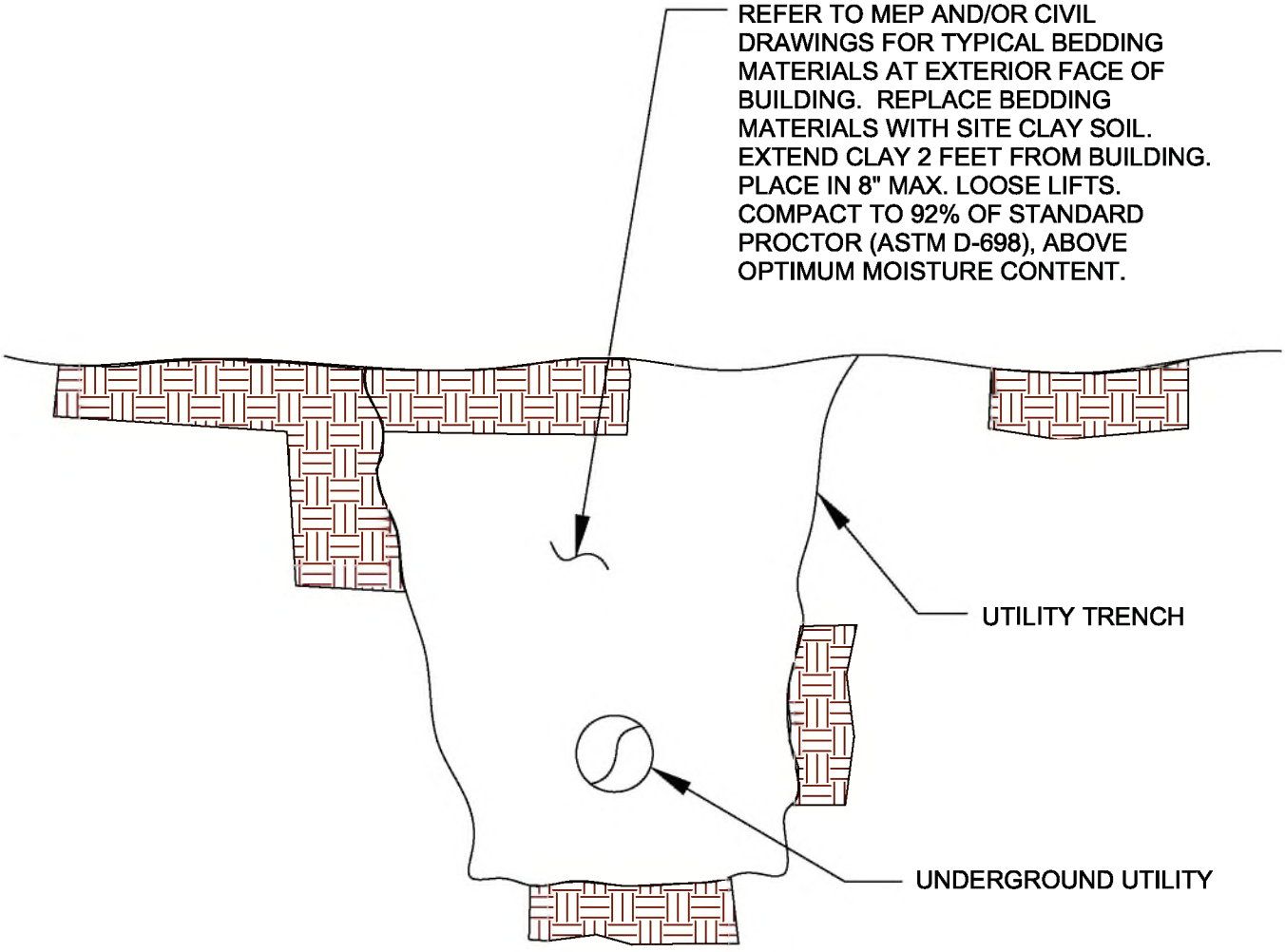
STEP 3



THE FABRIC IS LAPPED CLOSED AND
COVERED WITH BASE STONE

FRENCH DRAIN
INSTALLATION PROCEDURE

NOT TO SCALE



TYPICAL DETAIL DIAGRAM	ECS	**CLAY PLUG AT UTILITY TRENCH**	ENGINEER	SCALE NTS
			DRAFTSMAN CLL	PROJECT NO.
			REVISIONS	SHEET 1 OF 1
				DATE 11/7/08

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RENOVATION ASBESTOS SURVEY REPORT
REV 1

DALLAS INDEPENDENT SCHOOL DISTRICT
Org: 208
Seagoville Elementary School
304 N. Kaufman Street
Seagoville, Texas 75159

Abacus Project Number 153.172

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Section 4.0 Analytical Methodology 6

Section 5.0 Conclusions 7

Appendices

Appendix A: Bulk Sample Analytical Report
Appendix B: Inspector Certification and Laboratory Licenses
Appendix C: Drawings

CERTIFICATION OF RESULTS

Renovation Asbestos Survey Report

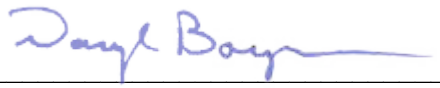
Seagoville Elementary School
304 N. Kaufman Street
Dallas, Texas 75159

Areas to be Renovated During the 2020 Bond Program

April 3, 2026

The following personnel have prepared and/or reviewed this report for accuracy, content, and quality of presentation. This report is respectfully submitted this 3rd day of April 2026.

Abacus Environment, Inc.



Daryl Boyne
Texas Department of Health
Individual Asbestos Consultant
License No. 10-5906

SUMMARY OF RESULTS

Seagoville Elementary School

Table 1: Bulk Sample Analysis					
HSA	SAMPLE #	MATERIAL TYPE & LOCATION	PLM ANALYSIS	ESTIMATED QUANTITY (OF IDENTIFIED ACM)	*EPA CAT
1	1 2 3	VCT, White w/Tan Specks (12" x 12"), Yellow Mastic - Throughout	ND ND	NA	
2	4 5 6	Ceiling Tile (2' x 2')	ND	NA	
3	7 8 9	Drywall, Joint Compound	ND ND ND ND ND	NA	
4	10 11 12	Floor Tile & Grout, Mortar	ND ND ND	NA	
5	13 14 15	Plaster	ND ND	NA	
6	**16** **17** **18**	**TSI Mastic**	**20% (2) – White Mastic** **ND-Insulation**	**100 LF**	
7	19 20 21	Grey Floor (12" x 12"), Yellow Mastic – Portable 1	ND ND	NA	
8	22 23 24	Cove Base Vinyl, Beige Mastic – Portable 1	ND ND	NA	
9	25 26 27	Acoustic Ceiling Tile (2' x 2') – Portable 1	ND	NA	
10	28 29 30	Drywall, Joint Compound – Portable 1	ND ND ND ND ND	NA	
11	31 32 33	Grey Floor (12" x 12"), Yellow Mastic, Level Set – Portable 3	ND ND ND	NA	
12	34 35 36	Cove Base Vinyl, Beige Mastic – Portable 3	ND ND	NA	
13	37 38 39	Acoustic Ceiling Tile (2' x 2') – Portable 3	ND	NA	

14	40 41 42	Textured Drywall, Joint Compound – Portable 3	ND ND ND ND ND	NA	
15	43 44 45	Grey Floor (12" x 12"), Yellow Mastic, Level Set – Portable 2	ND ND ND	NA	
16	46 47 48	Acoustic Ceiling Tile (2' x 2') – Portable 2	ND	NA	
17	49 50 51	Cove Base Vinyl, Beige Mastic – Portable 2	ND ND	NA	
18	52 53 54	Textured Drywall, Joint Compound – Portable 2	ND ND ND ND ND	NA	
19	55 56 57	White Floor Tile (12" x 12"), Yellow Mastic, Level Set - Portable 4	ND ND	NA	
20	58 59 60	Cove Base Vinyl, Beige Mastic – Portable 4	ND ND	NA	
21	61 62 63	Acoustic Ceiling Tile (2' x 2') – Portable 4	ND	NA	
22	64 65 66	Textured Drywall, Joint Compound – Portable 4	ND ND ND ND ND	NA	
23	67 68 69	White Floor Tile (12" x 12"), Yellow Mastic, Level Set - Portable 5	ND ND	NA	
24	70 71 72	Cove Base Vinyl, Beige Mastic – Portable 5	ND ND	NA	
25	73 74 75	Acoustic Ceiling Tile (2' x 2') – Portable 5	ND	NA	
26	76 77 78	Textured Drywall, Joint Compound – Portable 5	ND ND ND ND ND	NA	
27	79 80 81	Window/Door Caulking - Exterior	ND	NA	

* Samples not analyzed; laboratory stops after first positive detection of similar materials.

TABLE LEGEND:

HSA:	Homogenous Sampling Area (same material)
ESTIMATED QUANTITY:	SF - Square Feet
	LF - Linear Feet
PLM ANALYSIS:	NA - Not Analyzed / Positive Stop
	ND - None Detected
	(1) - Amosite
	(2) - Chrysotile
	(3) - Crocidolite
	(4) - Anthophyllite
	(5) - Tremolite
	(6) - Actinolite

***EPA CAT:**
Environmental Protection Agency Category

F = Friable
NF-I = Category I Non-Friable
40 CFR 61, Subpart M defines Category I Non-Friable ACM to include: asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products.

NF-II = Category II Non-Friable
40 CFR 61, Subpart M defines Category II Non-Friable ACM to include: any asbestos-containing non-friable material not designated as Category I.

N/A = Not Applicable

1.0 FACILITY DESCRIPTION

Facility Name:	Seagoville Elementary School 304 N. Kaufman Street Dallas, Texas 75159
Facility Use:	Elementary School
Survey Area Identification:	Limited to areas affected by renovation for the 2020 bond program

Survey Area Components	Description
Ceilings	Spray Applied Ceiling Tile
Ceilings/Walls	Plaster
Floors	Floor Tile and Mastic Expansion joints for concrete curb
Windows/Doors	Glazing Caulking Frame Caulking
HVAC	Thermal System Insulation (TSI) Duct Mastic

2.0 REGULATORY REFERENCES

Asbestos-related activities are regulated by many federal and state regulations, statutes and standards, including those of the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA) and the Texas Department of Health (TDH).

EPA REGULATIONS:

National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR 61]

The NESHAP regulations concern renovation and demolition notifications and removal and disposal of asbestos-containing materials (ACM). Also included in NESHAP are requirements concerning manufacturing, spraying and fabrication of ACM.

Asbestos-Containing Materials in Schools (40 CFR 763, Subpart E)

The Asbestos Hazard Emergency Response Act (AHERA) delineates the requirements for identification, assessment and management of asbestos-containing materials in schools.

Asbestos School Hazard Abatement Reauthorization Act (ASHARA) [Pub. L.101-637]

The ASHARA regulation amended AHERA to extend training and accreditation requirements to persons performing asbestos work in public and commercial buildings.

OSHA REGULATIONS:

29 CFR 1926.58: Construction Industry Standard (Public Sector Employees)
29 CFR 1926.1101: Construction Industry Standard (Private Sector Employees)

The construction industry standard covers employees engaged in demolition, construction, and the response actions and preventative measures such as removal, encapsulation, alteration, repair, maintenance, insulation, allowable levels of asbestos exposure, spill/emergency clean-up, transportation, disposal and storage of ACM.

29 CFR 1910.1001: General Industry Standard

The general industry standard applies to all occupational exposures other than for construction work, such as those personnel engaged in manufacturing and repair of asbestos-containing materials, with essentially the same areas of exposure regulations as the construction industry standard.

29 CFR 1910.134: Use of Respirators

The OSHA Respiratory Protection Rule defines the program and requirements, when personnel are required to wear respirators and the maintenance of respirators.

Texas Asbestos Health Protection Rules

The Texas Department of State Health Services (TDSHS), Texas Asbestos Health Protection Rules establishes procedures for means of control and minimization of public exposure to airborne asbestos fibers by regulating asbestos disturbance activities in buildings and commercial buildings. The TDSHS license such practices as consultants, contractors, laboratories and their workers as well as enforces TDSHS and EPA NESHAP regulations.

3.0 SAMPLING LIMITATIONS

The results, findings and conclusions expressed in this report are based only on conditions that were observed during our survey of the accessible areas of the school, the drawings issued to Abacus and the management plan obtained from the DISD offices. Abacus and this report make no representation or assumptions as to past conditions or future occurrences.

Any conditions or materials that were not readily visible and accessible were not sampled and may differ from those observed. The scope of this survey did not include conducting exploratory demolition to observe portions of the structure or materials that were not readily accessible. Materials visibly and completely identifiable as non-asbestos, e.g., fiberglass, glass, foam rubber and wood were not sampled.

Our selection of sample locations and frequency is based upon the scope of services and EPA AHERA and TDSHS sampling protocols, our observations and the assumption that like materials in the same areas are homogeneous. The quantities and locations of the ACM listed in this report are approximate only.

This report is prepared to assist the owner of the building, architect, construction manager, general contractors, and potential asbestos abatement contractors in locating the ACM. This report is not intended as a bidding document or as a project specification document.

Due to the limitations of the survey, suspect materials that were not sampled during this survey should be assumed to contain asbestos until sampling and analysis documents otherwise. Some materials are previously identified as ACM. This sampling event is necessary only if additional suspect materials are observed during future renovation or demolition activities that impact areas considered inaccessible during this inspection. Inaccessible areas of the site not accessed during this inspection are defined as all areas of the complex other than the fire/water damaged unit identified.

4.0 ANALYTICAL METHODOLOGY

The samples were analyzed in general accordance with the procedures outlined in the U.S. EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples as found in 40 CFR, Part 763, Subpart E, Appendix E (formerly Subpart F, Appendix A), or the current U.S. EPA method (EPA Method 600/R-93/116) for the analysis of asbestos in building materials, by polarized light microscopy. The results of each bulk sample relate only to the material tested and the results shall not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Material that contains greater than one percent of any type of asbestos fibers is defined by the EPA, OSHA (29 CFR 1926.1101), and TDSHS as an asbestos-containing material and must be handled according to regulations.

5.0 CONCLUSIONS

Asbestos was detected in the following materials:

- **Thermal System insulation Mastic**

We recommend we wait until the school is shut down and ready for renovation to do the roof testing.

If piping connections are required in crawl space, exact location of make safe zone will be determined by General Contractor to assist with new building connections.

If any additional materials are discovered during demolition/renovation activities in other locations of the building, these materials must be assumed to contain asbestos until sampling and analysis proves otherwise.

Appendix A:

Bulk Sample Analytical Report

PLM REPORT SUMMARY

Cates Laboratories
1339 Motor Circle
Dallas, Texas 75207 (214) 920-5006

NVLAP Lab No. 200569-0
TDSHS License No. 30-0287

Client: Abacus Environment, Inc.
Project (Line 1): Seagoville Elementary School
Project (Line 2):
Project No: 153.172
Identification: Asbestos, Bulk Sample Analysis
Test Method: Polarized Light Microscopy/Dispersion Staining (PLM/DS)
EPA Method 600/R-93/116

Lab Job No.: PLM-44132
Set No.: 63603
Report Date: 4/2/2026
Sample Date: Not Provided

On 4/1/2026, eighty-one (81) bulk samples were submitted by Mr. Daryl Boyne of Abacus Environment, Inc. for asbestos analysis by PLM/DS. Copies of the lab data sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Client Field I.D.	Sample Description/Location	Asbestos Content
CL1479216	01	VCT, White w/Tan Specks (12" X 12"), Yellow Mastic - Throughout	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479217	02	VCT, White w/Tan Specks (12" X 12"), Yellow Mastic - Throughout	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479218	03	VCT, White w/Tan Specks (12" X 12"), Yellow Mastic - Throughout	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479219	04	Ceiling Tile (2' X 2')	None Detected - Ceiling Tile
CL1479220	05	Ceiling Tile (2' X 2')	None Detected - Ceiling Tile
CL1479221	06	Ceiling Tile (2' X 2')	None Detected - Ceiling Tile
CL1479222	07	Drywall, Joint Compound	None Detected - Paint Layer None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479223	08	Drywall, Joint Compound	None Detected - Wall Covering None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479224	09	Drywall, Joint Compound	None Detected - Wall Covering None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479225	10	Floor Tile & Grout, Mortar	None Detected - Ceramic Tile None Detected - Grout None Detected - White Mastic
CL1479226	11	Floor Tile & Grout, Mortar	None Detected - Ceramic Tile None Detected - Grout None Detected - White Mastic

These samples were analyzed by layers. The overall percent asbestos for the sample is reported when relevant. The EPA considers a material to be asbestos containing only if it contains greater than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) – materials that are friable or may become friable – be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. CatesLab utilizes CVAE on a routine basis and does not include point counting unless specifically requested by the client. The results may not be reproduced except in full.

PLM REPORT SUMMARY

Cates Laboratories
1339 Motor Circle
Dallas, Texas 75207 (214) 920-5006

NVLAP Lab No. 200569-0
TDSHS License No. 30-0287

Client: Abacus Environment, Inc.
Project (Line 1): Seagoville Elementary School
Project (Line 2):
Project No: 153.172
Identification: Asbestos, Bulk Sample Analysis
Test Method: Polarized Light Microscopy/Dispersion Staining (PLM/DS)
EPA Method 600/R-93/116

Lab Job No.: PLM-44132
Set No.: 63603
Report Date: 4/2/2026
Sample Date: Not Provided

On 4/1/2026, eighty-one (81) bulk samples were submitted by Mr. Daryl Boyne of Abacus Environment, Inc. for asbestos analysis by PLM/DS. Copies of the lab data sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Client Field I.D.	Sample Description/Location	Asbestos Content
CL1479227	12	Floor Tile & Grout, Mortar	None Detected - Ceramic Tile None Detected - Grout None Detected - White Mastic
CL1479228	13	Plaster	None Detected - Plaster
CL1479229	14	Plaster	None Detected - Paint Layer None Detected - Plaster
CL1479230	15	Plaster	None Detected - Paint Layer None Detected - Plaster
CL1479231	16	TSI Mastic	20% Chrysotile - White Mastic None Detected - Insulation
CL1479232	17	TSI Mastic	Not Analyzed - Positive Stop
CL1479233	18	TSI Mastic	Not Analyzed - Positive Stop
CL1479234	19	Grey Floor (12" X 12"), Yellow Mastic - Portable 1	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479235	20	Grey Floor (12" X 12"), Yellow Mastic - Portable 1	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479236	21	Grey Floor (12" X 12"), Yellow Mastic - Portable 1	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479237	22	Cove Base Vinyl, Beige Mastic - Portable 1	None Detected - Cove Base None Detected - Yellow Mastic
CL1479238	23	Cove Base Vinyl, Beige Mastic - Portable 1	None Detected - Cove Base None Detected - Yellow Mastic
CL1479239	24	Cove Base Vinyl, Beige Mastic - Portable 1	None Detected - Cove Base None Detected - Yellow Mastic
CL1479240	25	Acoustic Ceiling Tile (2' X 2') - Portable 1	None Detected - Ceiling Tile
CL1479241	26	Acoustic Ceiling Tile (2' X 2') - Portable 1	None Detected - Ceiling Tile

These samples were analyzed by layers. The overall percent asbestos for the sample is reported when relevant. The EPA considers a material to be asbestos containing only if it contains greater than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) – materials that are friable or may become friable – be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. CatesLab utilizes CVAE on a routine basis and does not include point counting unless specifically requested by the client. The results may not be reproduced except in full.

PLM REPORT SUMMARY

Cates Laboratories
1339 Motor Circle
Dallas, Texas 75207 (214) 920-5006

NVLAP Lab No. 200569-0
TDSHS License No. 30-0287

Client: Abacus Environment, Inc.
Project (Line 1): Seagoville Elementary School
Project (Line 2):
Project No: 153.172
Identification: Asbestos, Bulk Sample Analysis
Test Method: Polarized Light Microscopy/Dispersion Staining (PLM/DS)
EPA Method 600/R-93/116

Lab Job No.: PLM-44132
Set No.: 63603
Report Date: 4/2/2026
Sample Date: Not Provided

On 4/1/2026, eighty-one (81) bulk samples were submitted by Mr. Daryl Boyne of Abacus Environment, Inc. for asbestos analysis by PLM/DS. Copies of the lab data sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Client Field I.D.	Sample Description/Location	Asbestos Content
CL1479242	27	Acoustic Ceiling Tile (2' X 2') - Portable 1	None Detected - Ceiling Tile
CL1479243	28	Drywall, Joint Compound - Portable 1	None Detected - Paint Layer None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479244	29	Drywall, Joint Compound - Portable 1	None Detected - Paint Layer None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479245	30	Drywall, Joint Compound - Portable 1	None Detected - Paint Layer None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479246	31	Grey Floor (12" X 12"), Yellow Mastic, Level Set - Portable 3	None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
CL1479247	32	Grey Floor (12" X 12"), Yellow Mastic, Level Set - Portable 3	None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
CL1479248	33	Grey Floor (12" X 12"), Yellow Mastic, Level Set - Portable 3	None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
CL1479249	34	Cove Base Vinyl, Beige Mastic - Portable 3	None Detected - Cove Base None Detected - Yellow Mastic
CL1479250	35	Cove Base Vinyl, Beige Mastic - Portable 3	None Detected - Cove Base None Detected - Yellow Mastic
CL1479251	36	Cove Base Vinyl, Beige Mastic - Portable 3	None Detected - Cove Base None Detected - Yellow Mastic

These samples were analyzed by layers. The overall percent asbestos for the sample is reported when relevant. The EPA considers a material to be asbestos containing only if it contains greater than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) – materials that are friable or may become friable – be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. CatesLab utilizes CVAE on a routine basis and does not include point counting unless specifically requested by the client. The results may not be reproduced except in full.

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Lab Job No.: PLM-44132
Set No.: 63603
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On 4/1/2026, eighty-one (81) bulk samples were submitted by Mr. Daryl Boyne of Abacus Environment, Inc. for asbestos analysis by PLM/DS. Copies of the lab data sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Client Field I.D.	Sample Description/Location	Asbestos Content
CL1479252	37	Acoustic Ceiling Tile (2' X 2') - Portable 3	None Detected - Ceiling Tile
CL1479253	38	Acoustic Ceiling Tile (2' X 2') - Portable 3	None Detected - Ceiling Tile
CL1479254	39	Acoustic Ceiling Tile (2' X 2') - Portable 3	None Detected - Ceiling Tile
CL1479255	40	Textured Drywall, Joint Compound - Portable 3	None Detected - Paint Texture None Detected - Paper None Detected - Wallboard Material
CL1479256	41	Textured Drywall, Joint Compound - Portable 3	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479257	42	Textured Drywall, Joint Compound - Portable 3	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479258	43	Grey Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 2	None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
CL1479259	44	Grey Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 2	None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
CL1479260	45	Grey Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 2	None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
CL1479261	46	Acoustic Ceiling Tile (2' X 2') - Portable 2	None Detected - Ceiling Tile
CL1479262	47	Acoustic Ceiling Tile (2' X 2') - Portable 2	None Detected - Ceiling Tile
CL1479263	48	Acoustic Ceiling Tile (2' X 2') - Portable 2	None Detected - Ceiling Tile

These samples were analyzed by layers. The overall percent asbestos for the sample is reported when relevant. The EPA considers a material to be asbestos containing only if it contains greater than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) – materials that are friable or may become friable – be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. CatesLab utilizes CVAE on a routine basis and does not include point counting unless specifically requested by the client. The results may not be reproduced except in full.

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Project No: 153.172
Identification: Asbestos, Bulk Sample Analysis
Test Method: Polarized Light Microscopy/Dispersion Staining (PLM/DS)
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On 4/1/2026, eighty-one (81) bulk samples were submitted by Mr. Daryl Boyne of Abacus Environment, Inc. for asbestos analysis by PLM/DS. Copies of the lab data sheets are attached; additional information may be found therein. The results are summarized below:

Lab Sample No.	Client Field I.D.	Sample Description/Location	Asbestos Content
CL1479264	49	Cove Base Vinyl, Beige Mastic - Portable 2	None Detected - Cove Base None Detected - Yellow Mastic
CL1479265	50	Cove Base Vinyl, Beige Mastic - Portable 2	None Detected - Cove Base None Detected - Yellow Mastic
CL1479266	51	Cove Base Vinyl, Beige Mastic - Portable 2	None Detected - Cove Base None Detected - Yellow Mastic
CL1479267	52	Textured Drywall, Joint Compound - Portable 2	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479268	53	Textured Drywall, Joint Compound - Portable 2	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479269	54	Textured Drywall, Joint Compound - Portable 2	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479270	55	White Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 4	None Detected - Floor Tile
CL1479271	56	White Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 4	None Detected - Floor Tile
CL1479272	57	White Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 4	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479273	58	Cove Base Vinyl, Beige Mastic - Portable 4	None Detected - Cove Base None Detected - Yellow Mastic
CL1479274	59	Cove Base Vinyl, Beige Mastic - Portable 4	None Detected - Cove Base None Detected - Yellow Mastic

These samples were analyzed by layers. The overall percent asbestos for the sample is reported when relevant. The EPA considers a material to be asbestos containing only if it contains greater than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) – materials that are friable or may become friable – be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. CatesLab utilizes CVAE on a routine basis and does not include point counting unless specifically requested by the client. The results may not be reproduced except in full.

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Lab Job No.: PLM-44132
Set No.: 63603
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Sample Date: Not Provided

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Lab Sample No.	Client Field I.D.	Sample Description/Location	Asbestos Content
CL1479275	60	Cove Base Vinyl, Beige Mastic - Portable 4	None Detected - Cove Base None Detected - Yellow Mastic
CL1479276	61	Acoustic Ceiling Tile (2' X 2') - Portable 4	None Detected - Ceiling Tile
CL1479277	62	Acoustic Ceiling Tile (2' X 2') - Portable 4	None Detected - Ceiling Tile
CL1479278	63	Acoustic Ceiling Tile (2' X 2') - Portable 4	None Detected - Ceiling Tile
CL1479279	64	Textured Drywall, Joint Compound - Portable 4	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound
CL1479280	65	Textured Drywall, Joint Compound - Portable 4	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479281	66	Textured Drywall, Joint Compound - Portable 4	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479282	67	White Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 5	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479283	68	White Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 5	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479284	69	White Floor Tile (12" X 12"), Yellow Mastic, Level Set - Portable 5	None Detected - Floor Tile None Detected - Yellow Mastic
CL1479285	70	Cove Base Vinyl, Beige Mastic - Portable 5	None Detected - Cove Base None Detected - Beige Mastic
CL1479286	71	Cove Base Vinyl, Beige Mastic - Portable 5	None Detected - Cove Base None Detected - Beige Mastic

These samples were analyzed by layers. The overall percent asbestos for the sample is reported when relevant. The EPA considers a material to be asbestos containing only if it contains greater than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) – materials that are friable or may become friable – be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. CatesLab utilizes CVAE on a routine basis and does not include point counting unless specifically requested by the client. The results may not be reproduced except in full.

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EPA Method 600/R-93/116

Lab Job No.: PLM-44132
Set No.: 63603
Report Date: 4/2/2026
Sample Date: Not Provided

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Lab Sample No.	Client Field I.D.	Sample Description/Location	Asbestos Content
CL1479287	72	Cove Base Vinyl, Beige Mastic - Portable 5	None Detected - Cove Base None Detected - Beige Mastic
CL1479288	73	Acoustic Ceiling Tile (2' X 2') - Portable 5	None Detected - Ceiling Tile
CL1479289	74	Acoustic Ceiling Tile (2' X 2') - Portable 5	None Detected - Ceiling Tile
CL1479290	75	Acoustic Ceiling Tile (2' X 2') - Portable 5	None Detected - Ceiling Tile
CL1479291	76	Textured Drywall, Joint Compound - Portable 5	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479292	77	Textured Drywall, Joint Compound - Portable 5	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479293	78	Textured Drywall, Joint Compound - Portable 5	None Detected - Paint Texture None Detected - Joint Tape None Detected - Joint Compound None Detected - Paper None Detected - Wallboard Material
CL1479294	79	Window/Door Caulking - Exterior	None Detected - Caulking
CL1479295	80	Window/Door Caulking - Exterior	None Detected - Caulking
CL1479296	81	Window/Door Caulking - Exterior	None Detected - Caulking

These samples were analyzed by layers. The overall percent asbestos for the sample is reported when relevant. The EPA considers a material to be asbestos containing only if it contains greater than one percent asbestos by Calibrated Visual Area Estimation (CVAE). EPA regulations also indicate that Regulated Asbestos Containing Materials (RACM) – materials that are friable or may become friable – be further analyzed by point counting when the results indicate less than ten percent asbestos by CVAE. CatesLab utilizes CVAE on a routine basis and does not include point counting unless specifically requested by the client. The results may not be reproduced except in full.

PLM REPORT SUMMARY

Cates Laboratories
1339 Motor Circle
Dallas, Texas 75207 (214) 920-5006

NVLAP Lab No. 200569-0
TDSHS License No. 30-0287

Client:	Abacus Environment, Inc.	Lab Job No.:	PLM-44132
Project (Line 1):	Seagoville Elementary School	Set No.:	63603
Project (Line 2):		Report Date:	4/2/2026
Project No:	153.172	Sample Date:	Not Provided
Identification:	Asbestos, Bulk Sample Analysis		
Test Method:	Polarized Light Microscopy/Dispersion Staining (PLM/DS) EPA Method 600/R-93/116		

On 4/1/2026, eighty-one (81) bulk samples were submitted by Mr. Daryl Boyne of Abacus Environment, Inc. for asbestos analysis by PLM/DS. Copies of the lab data sheets are attached; additional information may be found therein.

STATEMENT OF LABORATORY ACCREDITATION

The samples were analyzed in general accordance with the procedures outlined in the U.S. EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples as found in 40 CFR, Part 763, Subpart E, Appendix E (formerly Subpart F, Appendix A), or the current U.S. EPA method (EPA Method 600/R-93/116) for the analysis of asbestos in building materials, by polarized light microscopy. The results of each bulk sample relate only to the material tested and the results shall not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Specific questions concerning bulk sample results shall be directed to the Laboratory Director.

Analyst: Kathy Schosek



Laboratory Director: John R. Cates, P.G.

Approved Signatory:



NVLAP®

TESTING
NVLAP LAB CODE 200569-0

Appendix B:

Inspectors Certifications and Laboratory Licenses

Texas Department of State Health Services

ABACUS ENVIRONMENT 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: 100191

Expiration Date: 12/06/2026

J. A. Shuford, MD

Jennifer Shuford, MD, MPH,
Commissioner of Health

Control Number: 97723

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

SEE BACK

Texas Department of State Health Services

CATES LABORATORIES INC

is certified to perform as an

Asbestos Laboratory

PCM, PLM

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: 300287

Expiration Date: 04/07/2027

Jennifer Shuford, MD, MPH,
Commissioner of Health

Control Number: 96872

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

SEE BACK

TEXAS
Health and Human Services

Texas Department of State Health Services

Asbestos Individual Consultant



DARYL J BOYNE

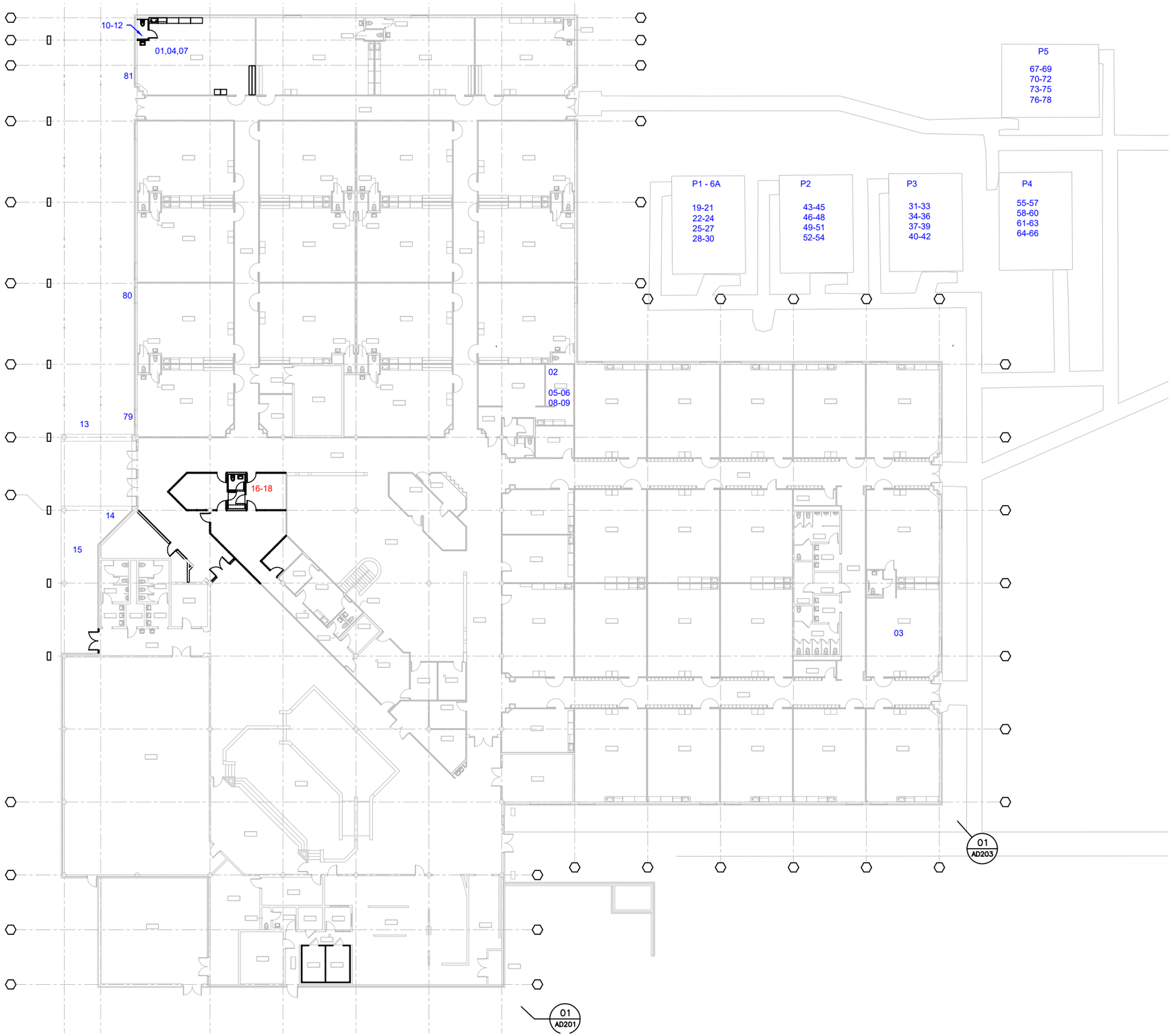
License Number: 105906

Control Number: 98492

Expiration Date: 3-Nov-2026

Appendix C:

Drawings



General Notes

LEGEND:

XX - SAMPLE LOCATIONS

XX - ACM (ASBESTOS CONTAINING MATERIAL)

No.	Revision/Issue	Date
-	-	

Firm Name and Address

ABACUS ENVIRONMENT INC.
5480 LA SIERRA DR.
DALLAS, TX 75231

Project Name and Address

SEAGOVILLE ELEMENTARY SCHOOL
304 N KAUFMAN ST
SEAGOVILLE, TX 75159

Project	Sheet
ACM SAMPLE LOCATIONS	ACM1
Date: 04/03/26	
Scale:	

DALLAS INDEPENDENT SCHOOL DISTRICT
CONSTRUCTION SERVICES

Project Manual

VOLUME 2 OF 2

CSP 250086

Org 208 – Seagoville Elementary School – Addition and Renovation

A/E FIRM
RGM Architects, LLC

MJ Thomas Engineering, LLC
Berkenbile Landscape Architects, Inc.
Stratus Team, LLC

Drytec Moisture Protection Technology Consultants, Inc.
PMY Group
5G Studio Collaborative

April 5, 2026

DALLAS INDEPENDENT SCHOOL DISTRICT
CONSTRUCTION SERVICES

Project Manual

VOLUME 2 OF 2

CSP 250086

Org 208 – Seagoville Elementary School – Addition and Renovation

A/E FIRM
RGM Architects, LLC

April 05, 2026

ARCHITECT AND CONSULTANTS SEALS PAGE

ARCHITECT:

RGM ARCHITECTS LLC

RGM ARCHITECTS LLC
BRIAN COOK
2001 N. LAMAR STREET
SUITE 200
DALLAS, TEXAS 75202
214-625-2622



CIVIL ENGINEER:

MJ THOMAS ENGINEERING

MICHAEL THOMAS
4700 BRYANT IRVIN COURT
SUITE 204
FORT WORTH, TEXAS 76107
817-732-9839



MJ Thomas Engineering, LLC.
F-9435
03/31/2026

LANDSCAPE ARCHITECT:

BERKENBILE LANDSCAPE ARCHITECTS, INC

04-05-2026

STEPHEN BERKENBILE
2355 JOHNSON ROAD
SOUTHLAKE TEXAS 76092
214-922-9946



SECTION 00 01 07 – SEALS PAGE

STRUCTURAL ENGINEER: **CHARLES GOJER & ASSOCIATES**

CHARLES GOJER
11615 FOREST CENTRAL DR,
SUITE 303
DALLAS, TEXAS 75243
PHONE: 214.340.1199



MEP ENGINEER: **STRATUS TEAM, LLC**

BENJIE LINKOUS
757 NORTH ELDRIDGE PARKWAY
SUITE 650
HOUSTON, TEXAS 77079
PHONE: 888.250.3795



04/05/2026

ROOFING CONSULTANT: **DRYTEC MOISTURE PROTECTION**

DANIEL T. DeMEYER
5720 LBJ FREEWAY,
SUITE #480
DALLAS, TX 75240
PHONE: 214.363.2192



04-05-2026

SECTION 00 01 07 – SEALS PAGE

TECHNOLOGY CONSULTANT: **PMY GROUP**

3424 MIDCOURT ROAD, SUITE 124
CARROLLTON, TEXAS 75006
PHONE: 214.364.5920



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10 14 63 Electronic Message Signage
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22 08 00 Commissioning of Plumbing Systems
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22 33 0 Electric, Domestic – Water Heaters
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SECTION 02 25 00

REMEDIATION WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Remediation of specified hazardous materials.

1.02 SCOPE OF WORK

A. Scope of work is described in the Primera-prepared reports entitled “Task 1 Services, Asbestos Containing Materials Evaluation”, and “Project Specific Scope of Work”.

B. Both reports are located in the Division 0 documents of this specification.

C. Provide remediation according to and in compliance with these documents and all relevant state and federal regulations.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment, and incidentals necessary for every type of required demolition.

B. Furnish equipment of every type required to demolish and transport construction debris away from the site.

1.02 QUALITY ASSURANCE [Not Used]

1.03 SUBMITTALS

Submittals shall be in accordance with Section 01 33 23 – Shop Drawings, Product Data, and Samples.

1.04 STANDARDS

Work shall be performed in accordance with the codes and ordinances of the agency having jurisdiction over the Place of Record.

1.05 DELIVERY AND STORAGE

Stockpile construction debris at the site only as long as necessary to arrange hauling to a disposal site. Stack materials neatly and handle in an orderly manner until removed from site. Construction debris shall be placed in trash containers. Do not allow trash to blow around the construction site.

1.06 JOB CONDITIONS

A. Contractor shall visit the site and determine the extent of demolition required and the site conditions that might affect his proposal. Include costs of covering all aspects of the demolition as part of the proposal.

B. The drawings shall be carefully reviewed to determine the extent of necessary demolition. Property lines and limits of demolition shall be accurately located prior to beginning site demolition. Demolition outside the limits indicated on the plans, or outside the property lines shall not be performed.

C. Material removed from the construction site during demolition, and any equipment not otherwise designated to remain the property of the Owner shall become the property of the Contractor and shall be promptly removed from the construction site.

D. Remove and dispose of off-site all drilled pier spoils.

PART 2 - PRODUCTS [Not Used]

PART 3 - EXECUTION

3.01 PREPARATION

A. Mark areas to be cleared and grubbed prior to commencing clearing additional requirements. Program Manager shall approve clearing and grubbing limits prior to commencement of clearing operations.

B. The clearing limits shall not extend beyond the project limits, plus adequate distance as approved by the Program Manager to allow for construction procedures.

3.02 BACKFILLING

A. Backfill cavities resulting from demolition. Fill cavities occurring within the limits of building, structures, or pavements in accordance with the requirements of other sections of the specifications. Backfill and compact cavities outside the construction limits to the same density as the surrounding earth.

B. Except where further excavation extends beyond the cavities resulting from work performed under this section, fill holes with appropriate backfill material and compact to the density of the surrounding undisturbed soil. Finish the site by blading or other methods to smooth the area, remove ditches, mounds, or other natural or manmade irregular features. Blend grades together in a smooth uniform manner.

3.03 EXISTING LANDSCAPING

A. Remove trees and brush of all sizes and description within the limits of construction. Cut trees approximately 12" above ground line and grub out and remove the remaining stumps and roots. Remove root systems larger than one (1) inch to 12" below the lowest foundation line.

B. Protect trees and landscaping not designated to be removed from damage. Contractor and Program Manager shall visit the site and mark trees that are to remain. In the event that these trees are in close proximity to the construction, wrap trunks with 2” x 4” timber and take precautions to prevent damage to limbs and root systems.

C. Scrape the entire site within the limits of construction, including structures, building, streets, parking lots or other pavements clear of brush, under-growth, or other vegetation.

D. Felled trees, brush, lumber, concrete, and other debris shall become the property of the Contractor and shall be promptly removed from the site.

E. Areas that have gravel parking or areas that are HMAC surfaces shown to be removed will be excavated down to natural soil. All gravel will be stockpiled on site as per Engineer. Gravel may be used in other areas requiring gravel if approved by Engineer. All HMAC surfaces shall be disposed of legally off site.

3.04 EXISTING STRUCTURES

Remove any concrete or masonry structures within the limits of the construction, or as otherwise indicated, including concrete slabs, foundations, brick or other masonry work, concrete steps, septic tanks, sidewalks, pavements, curbs and gutters or other components.

3.05 BURIED STRUCTURES

Remove underground structures such as abandoned manholes, vaults, septic tanks and distribution field piping, inlets, buried trash, or debris.

3.06 UNDERGROUND UTILITIES

Take precautions during excavation procedures to guard against damage to active underground piping. In the event that inactive or abandoned pipelines are uncovered, determine that the lines are inactive, then remove buried piping within the limits of construction, or 4'-0" beyond the limits of buildings or other structures, or as needed to clear excavations. Plug both ends of such abandoned piping with concrete plugs.

3.07 FIELD QUALITY CONTROL

No burning will be permitted on the site.

3.08 CLEAN AND ADJUST

At conclusion of demolition, remove all remaining trash and debris from the construction site. Clean site to remove wind-blown paper, trash, or other debris.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMWORK AND ACCESSORIES

PART 1 – GENERAL

1.01 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.

1.02 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.

1.03 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 insure 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

1.04 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.

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.

JOB CONDITIONS

A. Coordinate formwork with work of other trades. Give other trades ample lead time for installation of their work.

PART 2 – PRODUCTS

2.01 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.

2.02 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 Sure Void 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.

2.03 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

3.01 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 faslework 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 faslework 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 sawcuts. 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.

3.02 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.

3.03 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.

3.04 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.

3.05 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	50F to	40F to	Less than	
Temperature	60F	60F	50F	40F

Side Forms of Beams & Walls & Columns		2 days	2 days	3 days Below	See Note
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.

3.06 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.

3.07 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 11 00

CONCRETE FORMING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish material and labor to form, tie, brace and support wet concrete, reinforcing steel and embedded items until the concrete has developed sufficient strength to remove forms.

1.02 QUALITY ASSURANCE

A. DESIGN CRITERIA

Forms shall be designed for the pressure exerted by a liquid weighing 150 pounds per cubic foot. The rate of placing the concrete, the temperature of the concrete, and all other pertinent factors shall be taken into consideration when determining the depth of the equivalent liquid. An additional design live load of 50 pounds per square foot shall be used on horizontal surfaces.

B. ALIGNMENT CONTROL

True alignment of walls and other vertical surfaces having straight lines or rectangular shapes shall be controlled and checked by the following procedures:

1. Forming shall be arranged with provisions for adjusting the horizontal alignment of a form, after the form has been filled with concrete to grade, using wedges, turn-buckles, or other adjustment methods. Establish a transit line or other reference so that adjustments can be made to an established line while the concrete in the top of the form is still plastic.
2. Adjusting facilities shall be at intervals which permit adjustments to a straight line. Concrete shall not be placed until adequate adjusting facilities are in place.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, SUBMITTAL PROCEDURES and shall include drawings or descriptions of construction joint locations.

1.04 STANDARDS

The applicable provisions of the following standards shall apply as if written here in their entirety:

A. American Concrete Institute (ACI) specifications:
ACI 361 Specifications for Structural Concrete for Buildings
ACI 318 Building Code Requirements for Reinforced Concrete

B. American Institute of Steel Construction (AISC) publication:
AISC Manual of Steel Construction

C. American Iron and Steel Institute (AISI) publication:
American Plywood Association (APA) standards

1.05 DELIVERY AND STORAGE

Lumber for forms shall be stacked neatly on platforms raised above ground.

1.06 JOB CONDITIONS

A. The Contractor shall notify the Engineer upon completion of various portions of the work required for placing concrete so that compliance with the plans and specifications may be monitored. The Engineer will authorize the Contractor to proceed with the placement after this has been completed and corrections, if required, have been made.

B. In hot weather, both sides of the face forms may be required to be treated with oil to prevent warping and to secure tight joints.

PART 2 - PRODUCTS

2.01 MATERIALS

A. LUMBER: Properly seasoned and of good quality; free from loose or unsound knots, knot holes, twists, shakes, decay, splits, and other imperfections which would affect its strength or impair the finished surface of the concrete.

B. FIBER BOARD FORM LINING: Hardboard finished smooth on one (1) side; minimum thickness of 3/16"*;* thoroughly wet with water at least 12 hours before using.

C. PLYWOOD FORM LINING: Conforming to APA HDO; exterior exposure waterproof adhesive, 3/8" thick.

D. FORM OIL: Light, clear oil; shall not discolor or injuriously affect the concrete surface, subsequent coatings, or delay or impair curing operations

2.02 FABRICATIONS

A. LUMBER: Lumber for facing or sheathing shall be surfaced on at least one (1) side and two (2) edges and sized to uniform thickness. Lumber of nominal 1" thickness or plywood of 3/4" thickness shall be permitted for general use on structures, if backed by a sufficient number of studs and wales.

B. SPECIAL FORM LUMBER

1. Molding for chamfer strips or other uses shall be made of redwood, cypress, or pine materials of a grade that will not split when nailed, and which can be maintained to a true line without warping. The form shall be mill cut and dressed on all faces. Fillet forms at sharp corners, both inside and outside and at edges, with triangular chamfer strips at all non-contiguous edges exposed to view. Thoroughly oil chamfer strips before installation on forms.
2. Construct forms for railings and ornamental work to standards equivalent to first class mill work.
3. All moldings, panel work, and bevel strips shall be straight and true with neatly mitered joints and designed so that the finished work shall be true, sharp, and clean-cut.

C. FORMS

1. Forms shall be built mortar-tight and of material sufficient in strength to prevent bulging between supports.
2. Reused forms or form lumber shall be maintained clean and in good condition as to accuracy, shape, strength, rigidity, tightness, and smoothness of surface.
3. All forms shall be so constructed as to permit removal without damage to the concrete. Exercise special care in framing forms for copings, offsets, railing and ornamental work, so that there will be no damage to the concrete when the forms are removed.

D. METAL FORMS

1. The specifications for "Forms" regarding design, mortar tightness, filleted corners, beveled projections, bracing, alignment, removal, re-use, oiling, and wetting shall apply equally to metal forms.
2. The metal used for forms shall be of such thickness that the forms will remain true to shape. Bolt and rivet heads on the facing sides shall be countersunk. Clamps, pins, or other connecting devices shall be designed to hold the forms rigidly together and to allow removal without injury to the concrete.
3. Metal forms which do not present a smooth surface or line up properly shall not be used. Exercise special care to keep metal free from rust, grease, or other foreign material that discolors the concrete.

E. FORM LININGS

1. Timber forms for exposed concrete surfaces which are to be given a rubbed finish shall be facelined with an approved type of form lining material.
2. If plywood is used for form lining, it shall be made with waterproof adhesive and have a minimum thickness of 3/4". It shall preferably be oiled at the mill and then be oiled or lacquered on the job before using.
3. If fiber beard is used, apply water to the screen side on the board. Stack the boards screen side to screen side. Use the smooth hard face as the contact surface of the form. Such surfaces may be formed with 3/4" thick plywood made with waterproof adhesive if backed with adequate studs and wales. The greatest strength of the outer plies should be at right angles to the studding. In this case, form lining will not be required.
4. Carefully align edges and faces of adjacent panels and fill the joints between panels with patching plaster or cold-water putty to prevent leakage. Lightly sand with No.0 sandpaper to make the joints smooth.
5. Forms which are reused shall have all unused form tie holes filled and smoothed as specified above.

F. FORM TIES

1. Metal form ties shall be used to hold forms in place and to provide easy metal removal. The use of wire for ties shall not be permitted.
2. Remove metal appliances which are used inside the forms to hold the forms in correct alignment to a depth of at least 1-1/2" from the surface of the concrete, without undue injury to the surface from chipping or spalling. Such devices, when removed, shall leave a smooth opening in the concrete surface no larger than 1" in diameter.
3. Burning off rods, bolts, or ties shall not be permitted.
4. Metal ties shall be held in place by devices attached to wales. Each device shall be capable of developing the strength of the tie.
5. Metal and wooden spreaders which are separate from the forms shall be wired from the top of form and shall be entirely removed as the concrete is placed.
6. The use of metal form ties which are encased in paper or other material to allow the removal of complete tie, and which leave a hole through the concrete structure, shall not be permitted in the construction of basement or water bearing walls.

G. FALSEWORK

1. Falsework shall be designed and constructed so that no excessive settlement or deformation occurs. Falsework shall provide necessary rigidity.

2. Timber used in falsework centering shall be sound, in good condition and free from defects which impair its strength.
3. Steel members shall be of adequate strength and shape for the intended purpose.
4 Timber piling used in falsework may be of any wood species which satisfactorily withstands driving and which adequately supports the superimposed load.
5. When sills or timber grillages are used to support falsework Columns, unless founded on solid rock, shale, or other hard materials, place them in excavated pits. Backfill to prevent the softening of the supporting material from form drip or from rains that may occur during the construction process. Sills or grillages shall be of ample size to support the superimposed load without settlement.
6. Falsework not founded on a satisfactory spread footing shall be supported on piling, which shall be driven to a bearing capacity to support the superimposed load without settlement.

PART 3 - EXECUTION

3.01 PREPARATION

Before placing concrete, ensure that embedded items are correctly, firmly, and securely fastened into place. Embedded items shall be thoroughly clean and free of oil and other foreign material. Anchor bolts shall be set to exact locations by the use of suitable anchor bolt templates.

3.02 INSTALLATION

A. Pre-placement

1. During the elapsed time between building the forms and placing the concrete, maintain the forms to eliminate warping and shrinking.
2. Treat the facing of forms with suitable form oil before concrete is placed. Apply oil before the reinforcement is placed. Wet form surfaces which will come in contact with the concrete immediately before the concrete is placed.
3. At the time of placing concrete, the forms shall be clean and entirely free from all chips, dirt, sawdust, and other extraneous matter at the time. Forms for slab, beam and birder construction shall not have tie wire cuttings, nails, matches or any other matter which would mar the appearance of the finished construction. Clean forms and keep them free of foreign matter during concrete placement.

B. PLACEMENT

1. Set and maintain forms to the lines designated, until the concrete is sufficiently hardened to permit form removal. If, at any stage of the work, the forms show signs of bulging or sagging, immediately remove that portion of the concrete causing this condition. If necessary, reset the forms and securely brace against further movement.
2. Provide adequate cleanout openings where access to the bottom of the forms is not otherwise readily attainable.
3. Carefully and accurately place and support reinforcement in concrete structures.

C. REMOVAL

Remove forms so that the underlying concrete surface is not marred or damaged in any way. Forms shall not be removed until the concrete has attained sufficient strength (minimum of 28-day compressive strength) to safely carry the dead load, but in no case less than the number of curing days set forth in the following table.

Forms for concrete paving.	7-day min. OR 75% design strength

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish labor and reinforcing materials required to cut, bend, tie, splice, place and support the reinforcement in the material grades, sizes, quantities, and locations specified.

1.02 QUALITY ASSURANCE

TOLERANCES

Reinforcement shall be placed where specified, with the following maximum tolerances, plus or minus:

A. Cover 1/4"

B. Spacings 1/4" in 12"

1.03 SUBMITTALS

Submittals shall be in accordance with Section 01 33 00, SUBMITTALS and shall include:

A. Record data for layouts (shop drawings with bar lists clearly marked with reference to plans.

B. Certifications of steel quality, size, grade, and manufacturers origin.

1.04 STANDARDS

The applicable provisions of the following standards shall apply as if written here in their entirety:

A. American Society for Testing and Materials (ASTM) standards:

ASTM A615“Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement”

B. American Concrete Institute (ACI) publications:

ACI 301 “Specification for Structural Concrete for Buildings”
ACI 315 “Details and Detailing of Concrete Reinforcement”
ACI 318 “Building Code Requirements for Reinforced Concrete”

C. Concrete Reinforcing Steel Institute (CRSI) publication:

CRSI Manual of Standard Practice

1.05 DELIVERY AND STORAGE

Store steel reinforcement above the surface of the ground upon platform skids or other supports. Protect from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the work, steel reinforcement shall be free from dirt, scale, dust,

paint, oil, and other foreign material. Tag and store steel reinforcement for ease of correlation with shop drawings.

1.06 JOB CONDITIONS

A. Proposed deviations from reinforcing indicated on the plans or specifications shall be approved in writing by the Engineer prior to fabrication.

B. Bar lengths shall be of the length shown on the plans or tables, not the minimum code length.

C. Specified cover for reinforcing shall be maintained throughout construction. Bars shall be cut to lengths necessary to allow for proper clearances.

D. Stirrups shall be hooked.

E. Steel reinforcing bars shall be produced in the United States of America.

F. Cover of concrete shall be measured from face of forms to outside face of reinforcement bar, stirrup, or tie.

PART 2 - PRODUCTS

2.01 MATERIALS

A. STEEL REINFORCING BARS: Billet-Steel bars for concrete reinforcement conforming to ASTM A615; Grade 60 with minimum yield strength of 60,000 psi.

B. SUPPORTS: Bar supports shall be of the proper type for the intended use. Bar supports shall be uniform high-density polyethylene (plastic) or fiberglass reinforced plastic (FRP) conforming to CRSI Class 1, Maximum Protection.

C. SPACERS: Pre-cast mortar or concrete blocks.

D. MECHANICAL BAR SPLICES: Cadweld splices as manufactured by Erico Products, Inc., or equal, installed in strict accordance with the manufacturer's instructions and recommendations. The mechanical devices shall develop at least 125% of the specified yield of the spliced bars.

E. MECHANICAL THREADED SPLICES: Mechanical threaded connections shall utilize a metal coupling sleeve with internal threads which engage threaded ends of the bars to be spliced and shall develop in tension or compression 125% of the specified yield strength of the bar.

2.02 FABRICATIONS

BENDING: Reinforcement shall be bent cold by machine to shapes indicated on the plans; true to shapes indicated; irregularities in bending shall be cause for rejection. Unless otherwise noted, all hook and bend details and tolerances shall conform to the requirements of ACI 315 and ACI 318.

PART 3 - EXECUTION

3.01 PREPARATION

The reinforcing steel in all concrete walls shall be spaced its proper distance from the face of the forms using chairs.

3.02 INSTALLATION

A. GENERAL: Place the reinforcement carefully and accurately in the concrete structures. Rigidly tie and support the reinforcement. Welding of any type of reinforcement shall not be permitted.

B. SPLICES

1. Splicing of bars, except where indicated on the plans, shall not be permitted. Lap splices which are permitted shall have a lap in accordance with ACI 318. Rigidly clamp or wire the bars at all splices, in accordance with ACI. Welding of reinforcing steel splices shall not be permitted.
2. Make mechanical splices using “Cadweld” reinforcing bar connectors, installed in strict accordance with the manufacturer’s instructions and recommendations. The mechanical device shall develop at least 125% of the specified yield strength of the bar.
3. Lap splice locations not shown on the plans shall be approved by the Engineer prior to fabrication. Splices shall be kept to a minimum. Splices shall occur only at points of minimum stress. Stagger splices in adjacent bars.

C. PLACEMENT

1. Place steel reinforcement, as indicated on the plans, with the specified tolerances. Hold securely in place during the placing of the concrete. The minimum clear distance between bars shall be per ACI 318. Always pass vertical stirrups around the main tension members and securely attach thereto. Wire reinforcing together at a sufficient number of intersections to produce a sound, sturdy mat or cage of reinforcement that will maintain the reinforcement in correct positions when the concrete is placed.
2. Hold the reinforcing steel in concrete slabs firmly in place with wire supports or “chairs”. Sizing and spacing of the chairs shall be sufficient to properly support the steel and shall be in accordance with CRSI Publications “Manual of Standard Practice”.
3. Space the reinforcing steel in concrete walls the proper distance from the face of the forms, as indicted on the drawings, using galvanized metal spacers.
4. Where reinforcing conflicts with location of anchor bolts, inserts, etc., required to be cast in concrete, submit prompt notifications so that revisions can be made before concrete is placed. No cutting of reinforcing shall be permitted without the prior approval of the Engineer.

3.03 FIELD QUALITY CONTROL

Concrete shall not be deposited until the Engineer has observed the final placing of the reinforcing steel and has given permission to place concrete.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Codes and Standards: Comply with the applicable provisions of the following codes, specifications, and standards:
   ACI 301 "Specifications for Structural Concrete for Buildings."
   ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete."
   ACI 311 "Recommended Practice for Concrete Inspection."
   ACI 318 "Building Code Requirements for Reinforced Concrete."
   ACI 347 "Recommended Practice for Concrete Formwork." Concrete Reinforcing Steel Institute, "Manual for Standard Practice."

B. Workmanship: Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerance, and finishes. Correct deficient unsatisfactory concrete as directed by Engineer.

C. Provide testing and inspection service for quality control testing during concrete operations in accordance with General Conditions.

1.02 SUBMITTALS

A. Shop Drawings: Concrete Reinforcement: Submit in accordance with General Conditions. Include drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete structures"; shows bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable size to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection. Use plywood complying with U.S. Product Standards PS-1 "B-B High Density Overlaid Concrete Form," Class 1.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

2.02 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60.

B. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs and spacers, supporting, and fastening reinforcing bars in place. Use wire bar type

supports complying with CRSI recommendations. Wood, brick, plastic, and other devices will not be acceptable

2.03 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I, domestic manufacture. Use only one brand of cement throughout the project.

B. Normal Weight Aggregates: ASTM C 33.

1. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances.
2. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
   a. Crushed stone processed from natural rock or stone.
   b. Washed gravel, either natural or crushed. Use of pit or bankrun gravel is not permitted.
   c. Maximum Aggregate Size: 1½".

C. Water: Clean, fresh, free from oil, acid, organic matter, or other deleterious substances.

D. Air-Entraining Admixture: ASTM C 260.

E. Fly ash and calcium chloride or admixture containing more than 0.1% chloride ions are not permitted.

2.04 RELATED MATERIAL

A. Membrane-Forming Curing Compound: ASTM C309, Type I.

B. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.
Product/manufacturer; one of the following:
Weldcrete; Larsen Products
EucoWeld; Euclid Chemical Co.
Sonocrete; Sonneborn-Contech
Acrylic Bondcrete; The Burke Co.

2.05 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mix for concrete, to produce a minimum 28-day compressive strength of 4,000 psi, as indicated on Contract Documents. Use an independent testing facility acceptable to the Architect for preparing and reporting proposed mix designs.

B. Proportion mixes by laboratory trial batch, using materials to be employed on the project for each class of concrete required, complying with ACI 211.1.

C. Submit written reports to the Architect of each proposed mix for each class concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Architect/Engineer.

D. Admixtures:

1. Use air-entraining admixture in exterior exposed concrete. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content of 5% (±1%) with a maximum water cement ratio of 0.50.

E. Slump Limits: Proportion and design mixes to result in concrete slump at the point of placement of not less than 3" and not more than 5".

2.06 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with the requirements of ASTM C94, and as herein specified. No additional water to be added to the batch for material with insufficient slump with approval of Architect/Engineer.

B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required. When the air temperature is between 85° F and 90° F, reduce the mixing and delivery time from 1-2 hours to 75 minutes, and when the air temperature is above 90° F, reduce the mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMS

A. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.

B. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms complying with ACI 347, to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against the concrete surfaces.

E. Chamfer exposed corners and edges as shown, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniforms smooth lines and tight edge joints.

F. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal. Provide ties so portion remaining within concrete after removal is at least 1½" inside concrete and which will not leave holes larger than 1" diameter in concrete surface.

G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and locations of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms after concrete placement if required to eliminate leaks.

I. Forms which are destroyed or damaged and are not capable of supporting the design load shall be replaced with new forms prior to placing concrete.

3.02 PLACING REINFORCEMENT

A. Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete-placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers.

D. Place reinforcement to obtain the minimum coverage for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.03 JOINTS

A. Construction Joints: Locate and install construction joints, which are not shown on the drawings, so as not to impair the strength and appearance of the structure, as acceptable to the Engineer.

B. Provide keyways at least 1½" deep in all construction joints in grade beams.

C. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints.

D. Control Joints per details.

3.04 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into the 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 the items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain the required elevations and contours in the finished slab surface. Provide and secure units sufficiently strong to support the types of screeds required. Align the concrete surface to the elevation of the screed strips by the use of strike-off templates.

3.05 PREPARATION OF FORM SURFACES

A. Coat the contact surfaces of forms with a form-coating compound before reinforcement is placed.

B. Do not allow excess form-coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.06 CONCRETE PLACEMENT

A. Pre-Placement Inspection: Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work. Thoroughly wet wood forms immediately before placing concrete, where form-coatings are not used. Notify the Architect/Engineer at least one (2) working days prior to concrete placement.

B. Coordinate the installation of joint materials and moisture barrier with placement of forms and reinforcing steel.

C. General: Comply with ACI 304, and as herein specified.

D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.

E. Placing Concrete in Forms: Deposit concrete in grade beam forms in horizontal layers not deeper than 48" and in a manner to avoid inclined construction joints. Place continuously where possible. Start placing at ends of section and progress toward the center. Do not place concrete in beams supported on piers until the concrete in the piers is no longer plastic.

F. Consolidate place concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use vibrators designed to operate with vibratory element submerged in concrete, maintaining a speed of not less than 6000 impulses per minute.

G. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.

H. Placing Concrete: Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.

I. Consolidate concrete during placing operation so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

J. Bring surfaces to the correct level with a straight-edge and strike off. Use bull floats and darbies to smooth the surface, leaving it free of humps or hollow. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations or while seep water is present on slab surface.

K. Maintain reinforcing in the proper position during concrete placement operations.

L. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliances with ACI 306.

M. Hot Weather Placing: When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305.

3.07 FINISH OR FORMED SURFACES

A. Related Unformed Surfaces: At horizontal offset and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces.

3.08 PAVING FINISHES

A. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps. Immediately after trowel finishing, slightly roughen surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.09 CONCRETE CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperature and maintain without drying at a relatively proper hardening. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than 72 hours. Begin Final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 168 cumulative hours (not necessarily consecutive) during which concrete has been exposed to air temperatures above 50° F. Avoid rapid drying at end of final curing period.

B. Concrete surfaces shall be cured by application of curing compound. Provide membrane curing by applying membrane-forming curing compound to damp concrete surfaces as soon as water film has disappeared. Apply uniformly in 2-coat continuous operation by power-spray equipment in accordance with manufacturer's directions. Apply second coat at right angle to first coat.

3.10 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, and similar parts of the work, may be removed 48 hours after placing concrete, provide concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

3.11 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable. Apply new form coating compound materials to concrete contact form 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.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill-in holes and openings left in concrete structures for passage of work by other trades, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete the work.

3.13 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, but only when acceptable to the Architect/Engineer. Remove and replace damaged concrete as directed by Engineer.

B. Cut out honeycomb, rock pockets, voids over ½" diameter, and holes left by tie rods and bolts, down to solid concrete, but in no case to a depth of less than 1". Make edge of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to the Architect/Engineer.

3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Concrete shall be sampled and tested for quality control during the placement of concrete, as follows:

1. Slump: ASTM C 143: One test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
2. Compression Test Specimens: ASTM C 31; one set of 4 standard cylinders for each compressive strength test. Mold and store cylinders for laboratory cured test specimens.
3. Compressive Strength Tests: ASTM C 39; one set for each 100 cu. Yds. or fraction thereof, of each concrete class placed in any day or for each 5,000 sq. Ft. of surface area placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days and the remaining specimen held for future testing, if required. Report test results in writing to the Architect and the Contractor on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of contractor, name of concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day test and 28-day tests.

B. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained. Test to determine adequacy of concrete will be by cored cylinders complying with ASTM C 42. Contractor shall pay for such test conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

C. Concrete shall meet the compressive strength as shown on the plans and specifications regardless of ACI 318. ACI 318 shall have no bearing on pass/fail of all site concrete.

END OF SECTION

SECTION 04 0100

MASONRY RESTORATION AND CLEANING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water and Chemical cleaning of masonry surfaces.

B. Repointing mortar joints.

C. Repair of damaged masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 0513 - Mortar and Masonry Grout.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
   1. Require attendance of parties directly affecting work of this section.
   2. Review conditions of installation, installation procedures, and coordination with related work.

B. Scheduling:
   1. Perform cleaning and washing of masonry between the hours of 7 am to 11 pm only.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on cleaning compounds.

1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Restorer: Company specializing in masonry restoration with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.

1.08 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

B. Maintain materials and surrounding air temperature to minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of masonry work.

C. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Restoration and Cleaning Chemicals:
   1. PROSOCO; www.prosoco.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CLEANING MATERIALS

A. Basis of Design: PROSOCO Enviro Klean EK Restoration Cleaner

B. Substitutions: See Section 01 6000 - Product Requirements.

2.03 MORTAR MATERIALS

A. Comply with requirements of Section 04 0513.

2.04 MASONRY MATERIALS

A. Brick: To match existing brick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces to be cleaned are ready for work of this section.

3.02 PREPARATION

A. Protect surrounding elements from damage due to restoration procedures.

B. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from restoration areas using means adequate to prevent damage.

D. Cover existing landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

F. Close off adjacent occupied areas with dust proof and weatherproof partitions.

G. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

H. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.03 REBUILDING

A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.

B. Support structure as necessary in advance of cutting out units.

C. Cut away loose or unsound adjoining masonry as directed.

D. Build in new units following procedures for new work specified in other section(s).

E. Mortar Mix: Colored and proportioned to match existing work.

F. Ensure that anchors are correctly located and built in.

G. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

3.04 REPOINTING

A. Perform repointing prior to cleaning masonry surfaces.

B. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.

C. Use power tools only after test cuts determine no damage to masonry units will result.

D. Do not damage masonry units.

E. When cutting is complete, remove dust and loose material by brushing.

F. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.

G. Moist cure for 72 hours.

3.05 CLEANING EXISTING MASONRY

A. Follow manufacturer's instruction for chemical cleaning of the existing masonry. Use cleaning materials only on types of masonry approved by manufacturer.

3.06 RESTORATION CLEANING

A. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.

B. Spray coat masonry with the appropriate restoration cleaner, mixed into solution in accordance with manufacturer's instructions.

C. Provide a second application if required to match mock-up area.

D. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.

E. Rinse from the bottom up with potable water applied at 400 psi and at a rate of 4 gal/min.

3.07 CLEANING

A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.

B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.

C. Clean surrounding surfaces.

END OF SECTION

SECTION 04 0513

MASONRY MORTARING AND GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED SECTIONS

A. Section 04 2001 – Masonry Veneer: Installation of mortar.

B. Section 04 2010 – Concrete Unit Masonry

C. Section 04 4301 – Stone Masonry Veneer

D. Section 04 7200 – Cast Stone Masonry

E. Section 08 1113 – Hollow Metal Doors and Frames: Grouting steel door frames installed in masonry.

1.03 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; current edition.

B. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; American Concrete Institute International; current edition.

C. ASTM C 94 - Standard Specification for Ready-Mixed Concrete; current edition.

D. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar, current edition.

E. ASTM C 150 - Standard Specification for Portland Cement; current edition.

F. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes; current edition.

G. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; current edition.

H. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout; current edition.

I. ASTM C 476 - Standard Specification for Grout for Masonry; current edition.

J. ASTM C 780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; current edition.

K. ASTM C 1019 - Standard Test Method for Sampling and Testing Grout; current edition.

L. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.

M. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate that the Property specification of ASTM C 270 is to be used. Also include required environmental conditions and admixture limitations.

C. Samples: Submit one sample of each available color of mortar, illustrating mortar color and color range from manufacturer's complete line of available colors. Architect will make an initial selection of mortar color for incorporation into the approval mock.

D. Reports: Submit reports on mortar indicating conformance of component mortar materials to requirements of ASTM C 270 and test and evaluation reports per ASTM C 780.

E. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C 476 and test and evaluation reports to requirements of ASTM C 1019.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: Comply with recommendations of IMIAWC (CW).

B. Hot Weather Requirements: Comply with IMIAWC (HW).

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland Cement: ASTM C 150, Type I – Normal. Standard gray color and white color are required.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Aggregate: ASTM C 144.

D. Grout Aggregate: ASTM C 404.

E. Water: Clean and potable.

F. Accelerating Admixture: Nonchloride type for use in cold weather.

G. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

H. Bonding Agent: Latex type.

2.02 MORTAR MIXES

A. Mortar for Unit Masonry: ASTM C 270, Property Specification.
   1. Engineered masonry: Type S.
   2. Masonry below grade and in contact with earth: Type S.
   3. Exterior, non-loadbearing masonry: Type N.
   4. Pointing mortar: Type N with maximum 2 percent ammonium stearate or calcium stearate per cement weight.

2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C 270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, re-temper only within two hours of mixing.

E. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.04 GROUT MIXES

A. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94.
   1. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
   2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

B. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94.
   1. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
   2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.05 GROUT MIXING

A. Mix grout in accordance with ASTM C 94.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

PART 3 EXECUTION

3.01 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with block masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

D. Do not displace reinforcement while placing grout.

E. Remove excess mortar from grout spaces.

3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.

3. Place grout for spanning elements in single, continuous pour.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 4000.

B. Test and evaluate mortar in accordance with ASTM C 780 procedures.
   1. Test with same frequency as specified for masonry units.

C. Test and evaluate grout in accordance with ASTM C 1019 procedures.
   1. Test with same frequency as specified for masonry units.

END OF SECTION

SECTION 04 2000

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete Block.

B. Reinforcement and Anchorage.

C. Flashings.

D. Lintels.

E. Accessories.

1.02 RELATED SECTIONS

A. Section 04 0513 - Mortar and Masonry Grout.

B. Section 07 9005 - Joint Sealers: Backing rod and sealant at control and expansion joints.

C. Section 08 3100 – Access Panels and Doors.

1.03 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 2005.

B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2005.

C. ASTM A 82/A 82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2005a.

D. ASTM A 153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2005.

E. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2006.

F. ASTM C 90 - Standard Specification for Loadbearing Concrete Masonry Units; 2006.

G. ASTM C 129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2005.

H. ASTM C 140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2005a.

I. ASTM C 780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2006.

J. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2005.

K. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2001.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and masonry accessories.

C. Samples: Submit a minimum of four samples of facing brick units and ground face concrete masonry units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 or applicable building code, whichever is more stringent.

1.08 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements, for additional provisions.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
   2. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, control joint edges, and other detailed conditions.
   3. Load-Bearing Units: ASTM C 90, lightweight.
      a. Hollow block.
      b. Exposed faces: Manufacturer's standard color and texture, unless otherwise indicated.
   4. Non-Loadbearing Units: ASTM C 129.
      a. Hollow block.
      b. Lightweight.

2.02 MORTAR AND GROUT MATERIALS

A. Mortar and grout: As specified in Section 04 0513.

2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Dur-O-Wal: www.dur-o-wal.com.
   2. Hohmann & Barnard, Inc: www.h-b.com.
   3. Masonry Reinforcing Corporation of America: www.wirebond.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Reinforcing Steel: ASTM A 615 Grade 60 (420) deformed billet bars; galvanized.

C. Single Wythe Joint Reinforcement: Truss type; ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

2.04 FLASHINGS

A. Rubberized Asphalt Flashing: Self-adhering polymer-modified asphalt sheet complying with ASTM D 1970; minimum 0.030 inch total thickness; with cross-linked polyethylene top and bottom surfaces.
   1. Manufacturers:
      a. Grace Construction Productswww.na.graceconstruction.com
         1. Product: Perm-A-Barrier Wall Flashing.
      b. Polyguard Products, Inc. www.polyguardproducts.com
         1. Product: Polyguard 400 Air and Moisture Barrier with preformed inside corners and end dams.
      c. Substitutions: See Section 01 6000 - Product Requirements.

B. Lap Sealant: Butyl type as specified in Section 07 9005.

2.05 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Dur-O-Wal: www.dur-o-wal.com.
      b. Hohmann & Barnard, Inc: www.h-b.com.
      c. Masonry Reinforcing Corporation of America: www.wirebond.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self expanding x by maximum lengths available.
   1. Manufacturers:
      a. Dur-O-Wal: www.dur-o-wal.com.
      b. Hohmann & Barnard, Inc: www.h-b.com.
      c. Masonry Reinforcing Corporation of America: www.wirebond.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

C. Drainage Devices: HDPE drainage device. Provide MORTAR NET, manufactured by Hohmann and Barnard.
   1. Substitutions permitted under provisions of Section 01 6000.

D. Stainless Steel Drip Plate: Provide “DP” stainless steel drip plate manufactured by Hohmann and Barnard at terminations of flashing.
   1. Substitutions permitted under provisions of Section 01 6000.

E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

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 roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Standard Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Interlock intersections and external corners, except for units laid in stack bond.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

I. Isolate masonry partitions from vertical structural framing members with a control joint.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.05 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.06 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 4 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend plastic and laminated flashings to within 1/4 inch of exterior face of masonry.

C. Lap end joints of flashings at least 4 inches and seal watertight with mastic or elastic sealant.

3.07 LINTELS

A. Install lintels as indicated on drawing schedules.

B. Install reinforced unit masonry lintels over openings where precast concrete lintels are not scheduled.
   1. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
   2. Place and consolidate grout fill without displacing reinforcing.
   3. Allow masonry lintels to attain specified strength before removing temporary supports.

3.08 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.09 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control and expansion joints.

B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

D. Size control joint in accordance with Section 07 9005 for sealant performance.

E. Form expansion joint as detailed.

3.10 BUILT-IN WORK

A. As work progresses, install built-in metal door frames, glazed frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, and plates and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.11 TOLERANCES

A. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.12 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape,and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.13 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01400.

B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C 67 requirements, sampling 5 randomly chosen units for each 50,000 installed.

C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C 140 for conformance to requirements of this specification.

D. Mortar Tests: Test each type of mortar in accordance with ASTM C 780, testing with same frequency as masonry samples.

3.14 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.15 PROTECTION OF FINISHED WORK

A. Without damaging completed work, provide protective boards at exposed external corners which are subject to damage by construction activities.

END OF SECTION

SECTION 04 2001

BRICK VENEER MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clay Facing Brick.

B. Reinforcement and Anchorage.

C. Flashings.

D. Installation of Lintels.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 04 0513 - Mortar and Masonry Grout.

B. Section 07 9000 - Joint Sealers: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2017a.

D. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

E. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

F. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.

1.04 SUBMITTALS

A. See Division 1 sections for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.

C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar and accessories and structural backup in mock-up.

B. Locate where directed.

C. Mock-up may remain as part of the Work, following approval.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.80 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 BRICK UNITS

B. Facing Brick: ASTM C216, Type FBS Smooth Face, Grade SW.
   1. Color and Texture: To match adjacent masonry in size, shape, color and texture.
   2. Nominal Size: As indicated on drawings.
   3. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.02 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 0513.

2.03 REINFORCEMENT AND ANCHORAGE

A. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, type 304 stainless steel to ASTM A580/580M.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners.
      a. Type 304 stainless steel ASTM A666, ASTM A480/A480M and ASTM A240/A240M.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick, type 304 stainless steel ASTM A580/A580M.
   2. Vertical adjustment: Not less than 3-1/2 inches.
   3. Manufacturers:
      a. Hohmann & Barnard, Inc; HB-200-X: www.h-b.com/#sle.
      b. Wire-Bond; #2411 HCL-711, www.wirebond.com
      c. Substitutions: In accordance with Section 01 6000 Product Requirements.

2.04 FLASHINGS

A. Membrane Non-Asphaltic Flashing Materials:
   1. Composite Polymer Flashings – Self-Adhering. Composite PVC with Elvaloy KEE; 40 mils thick with pressure-sensitive adhesive and release paper.
      a. Manufacturers:
         1) Hohmann & Barnard, Inc; Flex-Flash: www.h-b.com/#sle
         2) Hyload, Inc; Hyload Flashing Membrane: www.hyload.com/#sle
         3) Substitutions: See Section 01 6000 - Product Requirements.

B. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.05 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Blok-Lok Limited: www.blok-lok.com/#sle.
      b. Hohmann & Barnard, Inc: www.h-b.com/#sle.

c. WIRE-BOND: www.wirebond.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

B. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self expanding; in maximum lengths available.
1. Manufacturers:
a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
b. WIRE-BOND: www.wirebond.com/#sle.
c. Substitutions: See Section 01 6000 - Product Requirements.

C. Weeps: Molded honeycomb grilles, insect resistant.
1. Basis of Design Manufacturer: Hohmann & Barnard, Inc: www.h-b.com/#sle.
2. Basis of Design Product: Quadro-Vent, manufactured by Hohmann & Barnard, Inc.
a. Size: 3/8” x 3-3/8” x 2-1/2”.
3. Substitutions: See Section 01 6000 - Product Requirements.
2. Color: To be selected by Architect from manufacturer’s full range of colors.

D. Cavity Mortar Control: High density polyethylene mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
1. Panels to be installed at flashing locations.
2. Basis of Design Manufacturer: Hohmann & Barnard, Inc: www.h-b.com/#sle.
3. Basis of Design Product: Mortar Trap, manufactured by Hohmann & Barnard, Inc.
4. Substitutions: See Section 01 6000 - Product Requirements.

E. Termination Bars: Stainless steel; compatible with membrane and adhesives.
1. Basis of Design Manufacturer: Hohmann & Barnard, Inc: www.h-b.com/#sle.
2. Basis of Design Product: T1 Termination Bar, manufactured by Hohmann & Barnard, Inc.
3. Substitutions: See Section 01 6000 - Product Requirements.

F. Drip Edge: Stainless steel; compatible with membrane and adhesives.
1. Basis of Design Manufacturer: Hohmann & Barnard, Inc: www.h-b.com/#sle.
2. Basis of Design Product: DP Drip Plate, manufactured by Hohmann & Barnard, Inc.
3. Provide factory fabricated stainless steel corners and end dams at inside and outside corners.
4. Substitutions: See Section 01 6000 - Product Requirements.

G. Corners and End Dams: Provide factory fabricated stainless steel corners and end dams at inside and outside corners, below flashing.
1. Basis of Design Manufacturer: Hohmann & Barnard, Inc: www.h-b.com/#sle.

H. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

I. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

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 roughing into masonry work.

3.02 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:
   1. Bond: As indicated for different locations.
   2. Coursing: Three units and three mortar joints to equal 8 inches.
   3. Mortar Joints: Concave.

3.03 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar as work progresses.

D. Interlock intersections and external corners, except for units laid in stack bond.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

G. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.04 WEEPS/CAVITY VENTS

A. Install weeps in veneer walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.05 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.06 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Masonry Back-Up: Embed anchors to bond veneer at spacings vertically and horizontally that comply with applicable codes. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

B. Stud Back-Up: Embed anchors to bond veneer at spacings vertically and horizontally that comply with applicable codes. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center..

3.07 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 8 inches, minimum, to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Terminate flashing up 8 inches minimum on vertical surface of backing:
   1. Install vertical leg of flashing under fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer’s directions., lapping at least 4 inches and terminated with a termination bar.
   2. Anchor vertical leg of flashing into backing with a termination bar and sealant.
   3. Apply cap bead of sealant on top edge of self-adhered flashing.
   4. Adhere top of flashing to stainless steel drip edge.

C. Extend flashings to within 1/4 inch of exterior face of masonry.

D. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.08 LINTELS

A. Provide lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

B. Maintain minimum 8 inch bearing on each side of opening.

C. Provide slip sheet under each bearing end of lintel.

3.09 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

D. Form expansion joint as detailed on drawings.

3.10 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

F. Maximum clear distance at pipe, conduit and other masonry penetrations: Clear distance at any point not to exceed 1/8 inch from the surface of the penetrating component, when measured at any point.

3.11 CUTTING AND FITTING

A. Cut and fit for pipes, conduit and other masonry penetrations. See 3.10, F of this section for allowable tolerances. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 04 7200

CAST STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Related Documents: Provisions established within the General and Supplementary General Conditions of the Contract and Division 1 - General Requirements are collectively applicable to this Section.

B. Section Includes:
   1. Cast stone sills, molding, special trim units.
   2. Reinforcement, anchorages and accessories.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01 3000. Indicate sizes, shapes, materials, reinforcement, joint details, locations and anchorage.

B. Samples: Submit samples under provisions of Section 01 30 00. Submit 2 samples of cast stone finish for Architect's approval and selection of color and texture.

C. Submit manufacturers installation instructions under provisions of Section 01 30 00.

1.03 QUALITY ASSURANCE

A. Manufacturer: Minimum 5 years' experience fabricating similar work. Submit list of recent completed projects if requested.

B. Installer: Minimum 5 years' experience in similar types of work and be able to furnish a list of previous projects and references if requested by Architect.

C. Manufactured Units: Meet requirements of FS SS-S- 721C.

1.04 CERTIFICATES

A. Submit manufacturer's certificates that materials meet or exceed specified requirements.

1.05 ENVIRONMENTAL REQUIREMENTS

A. In hot weather, above 99 degrees with less than 50 percent relative humidity, protect construction from direct exposure to the sun and wind.

B. Cold Weather Requirements: IMIAC - Recommended Practices and Specifications for Cold Weather Masonry Construction.

1.06 DELIVERY AND STORAGE

A. Deliver, store and handle materials in accordance with Sections 01 60 00.

B. After curing, store, stack and transport in a manner to prevent cracking, chipping, spalling, staining and other injuries.

C. Store stone off ground and under cover.

1.07 PROTECTION

A. Protect stone to prevent concrete, asphalt, rainwater and other foreign material from defacing stone surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements herein, provide products from one of the following:
   1. Custom Castings.
   2. Architectural Cast Stone Corporation.
   3. T.X.I.

B. Substitutions: Under provisions of Section 01 25 13.

2.02 MATERIALS

A. Portland Cement: ASTM C 150, Type 1, in color selected by Architect.
   1. Acceptable Products:
      a. Trinity Concrete Products.
      b. Gifford Hill.

B. Course Aggregates: ASTM C 33, color as necessary to obtain final approved color of stone.

C. Sand: ASTM C 144.

D. Lime Putty: Hydrated lime, Type S, ASTM C 207.

E. Reinforcement Steel: ASTM A 615, Grade 60, domestic deformed steel bars, and ASTM A 82 plain, cold-drawn steel. Hot dip galvanize after fabrication, per ASTM A 153.

F. Anchors: Type 303 stainless steel wire and rods, sizes as detailed.

G. Water: Clean and free from deleterious substances.

H. Clear Sealer:
   1. Acceptable Products:
      a. NCP Klearseal by National Construction Products, Dallas, TX.
      b. White Rock M-6-50-8 by Sonneborn Building Products Division.
      c. Klere-Seal 900 by Pecora Corp.

2.03 MORTAR MIX

A. Refer to Section 04 0513 for mortar requirements.

2.04 FABRICATION

A. Reinforcement: Reinforce stone with wire and steel reinforcement bars as detailed or as necessary for structural integrity.

B. Stone:
   1. Fabricate stone in accordance with referenced standards. Steam for 16 hours after casting.
   2. Compressive Strength: Minimum 6,500 psi at 28 days of age.
   3. Moisture Absorption: Maximum 8 percent when tested according to ASTM C 97.
   4. True to dimensions and profiles with sharp, straight edges and uniform curves.
   5. Do not silicone coat stone.

C. Sealer: Apply 2 coats of clear sealer to exposed surfaces of stone at rate of 200 square feet per gallon, per coat. Apply in accordance with manufacturer's direction. Allow first coat to dry before applying second coat. Do not coat mortar setting or joint surfaces with sealer.

D. Anchors: Provide necessary dowel holes in stone.

E. Finish:
   1. Exposed Surfaces: Uniformly textured, light buff colored finish, entirely free of pits, holes or form marks, to match approved sample.
   2. Similar in texture to sand finished limestone.
   3. Leave unexposed setting surfaces rough.

2.05 FABRICATION TOLERANCES

A. Squareness: Not more than 1/8 inch in 6 feet out of square.

B. Warpage: Not more than 1/8 inch per 6 feet of length.

C. Location of Anchors and Inserts: Deviation of anchors or inserts from center line of location shown on drawings not greater than plus or minus 3/8 inch.

PART 3 EXECUTION

3.01 INSTALLATION

A. Set stainless steel anchor rods in setting bed.

B. Set stone plumb, level and true in full beds of mortar.

C. Grout dowels into holes in stone and secure anchor with stainless steel tie wire.

D. Leave securely anchored and bonded.

3.02 JOINTS

A. Provide 3/8 inch wide joints. Fill joints with mortar as stone is set. Leave joints tightly tooled and slightly concave.

B. Refer to Section 04 0513 and Section 04 2000 for additional requirements.

3.03 INSTALLATION TOLERANCES

A. Variation from unit to adjacent unit: 1/32 inch maximum.

B. Variation from plane of wall: 1/4 inch in 10 feet, and 1/2 inch in 20 feet or more.

C. Variation in joint thickness: 1/8 inch in 3 feet.

3.04 CONTROL/EXPANSION JOINTS

A. Do not continue horizontal joint reinforcing across control joints.

B. Install resilient control and expansion joint in continuous lengths in accordance with Section 07 9005.

C. Provide expansion joints where indicated on the drawings.

3.05 PATCHING

A. Patching of minor defects will be permitted if performed with proper materials, by skilled craftsmen, as approved by Architect, and patched areas blend-in with surrounding areas so that repair is not noticeable from viewing distance.

3.06 CLEANING

A. After stones are installed, remove foreign matter from surface of stone using a stiff brush, mild cleanser and clear water.

B. Use of acid is strictly prohibited.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 – GENERAL

1.01 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.

1.02 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 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: Section 01 41 00.
   2. Miscellaneous metal fabrications.
   3. Metal stairs.
   4. Finished painting.
   5. Grouting of base plates: Section 03 30 00.

1.03 QUALITY CONTROL

A. 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. 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. 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: Refer to Section 01 41 00.

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. 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 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 fabricator 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.

1.04 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. 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.

1.05 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.

1.06 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

2.01 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. 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.

2.02 FABRICATION

A. Shop Fabrication and Assembly:
   1. Fabricate and assemble structural assemblies in the shop to 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. 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. 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.

2.03 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

3.01 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.

3.02 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.

3.03 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 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 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 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.

3.04 CLEANUP

A. Clean up all debris caused by work of this Section, keeping the area clean and neat at all times.

END OF SECTION 05 12 00

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 - Section 01 41 00
   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 Section 01 41 00. 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

SECTION 05 30 00 - METAL ROOF DECK

PART 1 - GENERAL

1.01 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.

1.02 WORK INCLUDED

A. Roof Decking

1.03 RELATED WORK

A. Section 05 40 00 – Cold Formed Metal Framing

1.04 QUALITY ASSURANCE

A. Welder Qualifications: Welders and welding procedures shall comply with requirements of ANSI/AWS D1.1 Structural Welding Code.

1.05 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

1.06 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

2.01 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

3.01 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 40

COMPOSITE STEEL FLOOR DECK

PART 1 – 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 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 A516, 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 the wet weight of concrete and a 150 pound concentrated load acting at the slab edge without exceeding a stress of 0.6 FY and a deflection of ¾” maximum.

2.6 COMPOITE 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 X6 W14. 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 ¾’ 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

Floor 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 ¾” up from bottom of nearest deck rib running besides the opening from support to support. Provide blockout 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 an 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 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 Opening: 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, ad 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 a 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 5000

METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items for applications where framing and supports are not specified in other Sections.

1.02 REFERENCES

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; current edition.

B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; current edition.

C. ASME A17.1 Safety Code for Elevators and Escalators, current edition.

D. ASTM A 36 - Standard Specification for Carbon Structural Steel; current edition.

E. ASTM A 45 – Standard Specification for Gray Iron Castings, current edition.

F. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; current edition.

G. ASTM A 153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; current edition.

H. ASTM A 283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; current edition.

I. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; current edition.

J. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; current edition.

K. ASTM B 26 - Standard Specification for Aluminum-Alloy Sand Castings; current edition.

L. ASTM B 85 - Standard Specification for Aluminum-Alloy Die Castings; current edition.

M. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; current edition.

N. ASTM B 210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; current edition.

O. ASTM B 211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire; current edition.

P. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; current edition.

Q. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; current edition.

R. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; current edition.

S. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; current edition.

T. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; current edition.

U. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; current edition.

1.03 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

B. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.04 QUALITY ASSURANCE

A. Design metal fabrications to resist imposed loads under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Texas.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A 36.

B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.

C. Plates: ASTM A 283.

D. Pipe: ASTM A 53, Grade B Schedule 40, black finish.

E. Bolts, Nuts, and Washers: ASTM A 325, Type 1.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Provide material with maximum amount of recycled content available that achieves performance requirements of this Section,

I. Provide material with maximum amount of regional (within 500 miles) material feasible that achieves performance requirements of this Section,

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B 221, 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B 209, 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B 210, 6063 alloy, T6 temper.

D. Aluminum-Alloy Bars: ASTM B 211, 6061 alloy, T6 temper.

E. Aluminum-Alloy Sand Castings: ASTM B 26.

F. Aluminum-Alloy Die Castings: ASTM B 85.

G. Bolts, Nuts, and Washers: Stainless steel.

H. Welding Materials: AWS D1.1; type required for materials being welded.

I. Provide material with maximum amount of recycled content available that achieves performance requirements of this Section,

J. Provide material with maximum amount of regional (within 500 miles) material feasible that achieves performance requirements of this Section.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 DOWNSPOUT BOOTS

A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lub slots, integral cleanout, cleanout cover, and tamper proof fasteners
   1. Configuration: Angular or straight as shown on Drawings.
   2. Material: Cast iron, ATM A48, casting thickness 3/8 inch minimum.
   3. Finish, Manufacturer's standard factory applied powder coat finish.
   4. Color: To be selected by Architect.
   5. Accessories: Manufacturer's standard stainless steel fastenings, stainless steel building wall anchors, integral neoprene gaskets, and rubber coupling.
   6. Manufacturers:
      a. Neenah Foundry, a division of Neenah Enterprises, Inc.; www.nfco.com.
      b. Downspout Boots.com, a division of J. R. Hoe & Sons; www.downspoutboots.com.
      c. Substitutions: See section 01 6000 – Product Requirements.

2.04 FINISHES - STEEL

A. Prime paint all steel items. Comply with Division 1 Section "Indoor Air Quality Management Plan"
   1. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: Two coats.

2.05 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I natural anodized.

B. Interior Aluminum Surfaces: Class I natural anodized.

C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.06 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.07 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. Fabricate units from structural-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 retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4 inch thick by 8 inches long at 24 inches o.c., unless otherwise indicated.
   2. Furnish inserts if units must be installed after concrete is placed.

C. Fabricate supports for operable partitions as follows:
   1. Beams: Continuous steel shapes of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

2.08 MISCELLANEOUS STEEL TRIM

A Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

2.09 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.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset from True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 51 33

STEEL LADDERS

PART 1: GENERAL

1.01 SUMMARY

A. This section includes the following metal fabrications.
   1. Ladders.
B. Related Sections: Refer to Section 05 12 00, "Structural Steel" for structural steel framing components as applicable.

1.02 REFERENCES

A. American National Standards Institute (ANSI).
   1. A14.3 - Safety Requirements for Fixed Ladders.
B. American Society of Testing and Materials (ASTM).
C. American Welding Society (AWS).
   1. D1.1 - Structural Welding Code – Steel.
   2. D1.3 - Structural Welding Code - Sheet Steel.
D. National Association of Architectural Metal Manufacturers (NAAMM).
   1. AMP 500 Metal Finishes Manual.
   2. MBG 531 Metal Bar Grating Manual.
   3. MBG 532 Heavy Duty Metal Bar Grating Manual and Pipe Railing Manual.
E. Steel Structures Painting Council (SSPC).

1.03 DEFINITIONS

A. Refer to ASTM E985 for railing-related terms that apply to this section.
B. Refer to the NAAMM publications listed in Article 1.02 "References" for definition of terms that apply to this section.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Section 01 33 00, "Submittal Procedures"
B. Product Data: Submit product data for products used in metal fabrications, including paint products, grout and fasteners.
C. Shop Drawings: Submit detailed shop and erection drawings of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
D. Welder certificates signed by the Contractor certify that welders comply with requirements specified in1.05C.
E. Welding Procedures: Provide written welding procedure specification (WPS) document per AWS Code requirements.
F. Qualification data for firm specified in 1.05B to demonstrate their capabilities and experience.

1.05 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated. Where conflicts occur, comply with the more stringent requirements.
   1. ANSI 14.3.
   2. AWS D1.1 and D1.3.
   3. NFPA 101.
B. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that shown on the drawings, with sufficient production capacity to produce required units without causing delay in the work.
C. Qualify welding processes and welding operators in accordance with AWS D1.1 and D1.3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
D. All materials used shall be free of lead and asbestos fibers.

PART 2: PRODUCTS

2.01 FERROUS METALS

A. Metal Surfaces, General: Form metal fabrications exposed to view upon completion of the work, provide materials selected for their surface flatness, smoothness, and freedom from surface

blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by referenced standards for stretcher- leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A36.
C. Rolled Steel Floor Plates: ASTM A786.
D. Steel Bars for Gratings: ASTM A569 or ASTM A36.
E. Wire Rod for Grating Cross Bars: ASTM A510.
F. Steel Tubing: Cold-formed, ASTM A500, Grade B, unless otherwise indicated.
G. Galvanized Steel Sheet: Quality as follows:
   1. Structural Quality: ASTM A446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.
H. Steel Pipe: ASTM A53, Type S, Grade B, standard weight (schedule 40), black finish, unless otherwise indicated.
I. Gray Iron Castings: ASTM A48, Class 30.
J. Malleable Iron Castings: ASTM A47, Grade 32510.
K. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
L. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

2.02 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required. Suspect/counterfeit bolts will not be accepted and will be replaced at Contractor's expense.

2.03 PAINT

A. Shop Primer for Ferrous Metal: Red oxide, lead- and cadmium-free, corrosion- inhibiting primer complying with performance requirements of FS TT-P-664.
B. Galvanizing Repair Paint: High zinc dust content paint for galvanizing welds in galvanized steel, with dry film containing not less than 94% zinc dust by weight, and complying with SSPC-Paint-20.
C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint-12 except containing no asbestos fibers.
D. Zinc Chromate Primer: FS TT-P-645.

2.04 FABRICATION - GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss. Temperature change (Range): 120 °F.
D. Shear and punch metals cleanly and accurately. Remove burrs.
E. Ease exposed edges to a radius of approximately 1/32” (0.794 mm), unless otherwise indicated. Form bent- metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
F. Remove sharp or rough areas on exposed traffic surfaces.
G. Weld corners and seams continuously to comply with AWS recommendations and 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 that no roughness shows after finishing and contour of welded surface matched those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. 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.

K. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

2.05 STEEL LADDERS

A. General: Exterior fixed ladders shall meet OSHA requirements found in 29CFR1910.27, with the exception that #6 rebar is not to be used. Fabricate ladders for the locations shown, with dimensions, spacing's, details and anchorages as indicated. Comply with requirements of ANSI A14.3 where conflicts occur, comply with the more stringent requirements.

B. Side Rails: Continuous steel flat bars, minimum size (cross section) 2½" x ⅜" (63.5 mm x 9.5 mm), with eased edges, spaced 18" (0.46 m) apart.

C. Bar Rungs: Round corrugated steel bars, minimum ¾" (19.1 mm) diameter spaced no greater than 12" (305 mm) o.c. and uniform throughout the length of the ladder and be treated to resist corrosion and rusting.

D. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

E. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" (1.5 m) o.c. by means of welded brackets, unless otherwise indicated.

1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7" (178 mm).
2. Extend side rails 42" (1.1 m) above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access

2.06 MISCELLANEOUS METAL ITEMS

A. Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated, which are not parts of structural steel framework, as required to complete work.

1. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
2. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Except as otherwise indicated, space anchors
   24" (61 cm) o.c. and provide minimum anchor units in the form of steel straps 1¼" wide x ¼" x 8"
   long (31.8 mm x 6.4 mm x 203 mm).

B. Miscellaneous Steel Trim: Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination for assembly and installation with other work.

2.07 STEEL AND IRON FINISHES

A. General: Shop-paint uncoated surfaces of metal fabrications, except those to be embedded in concrete or masonry or to receive sprayed-on fireproofing, surfaces and edges to be welded,

and galvanized surfaces, unless otherwise indicated. Comply with requirements of SSPC-PA 1 for shop painting.

B. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot- dip process in compliance with the following requirements:
   1. ASTM A123 for galvanizing both fabricated and non-fabricated iron and steel products made of uncoated rolled, pressed, and forced shapes, plates, bars, and strip 0.0299" (0.7595 mm) thick and heavier.
   2. ASTM A153 for galvanizing iron and steel hardware.

C. Surface Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below.
   1. Remove oil, grease and similar contaminants in accordance with SP-1, "Solvent Cleaning".
   2. Remove loose rust, scale, spatter, slag and other deleterious materials in accordance with SSPC.

D. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 3.0 mils (0.076 mm). Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection.

PART 3: EXECUTION

3.01 EXAMINATION

A. Installer shall examine the areas and conditions under which metal fabrication items are to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer and Architect

3.02 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Center nosing's on tread widths with noses flush with riser faces and tread surfaces.

C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.03 INSTALLATION - GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, and through-bolts, lag bolts, wood screws and other connectors as required.

B. Cutting, Fitting and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. 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 the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

E. Field Welding: Comply with AWS Code for procedures of manual shielded metal- arch welding, appearance and quality of welds made, methods used in correcting welding work, and 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 that no roughness shows after finishing and contour of welded surfaces matches those adjacent.

F. Grout: Follow manufacturer's recommendations for substrate preparation and application.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

3.04 ADJUSTING AND CLEANING

A. Touch-Up Painting of Steel Items: Immediately after erection, clean field welds, bolted connections, abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch- up of field painted surfaces. Apply by brush or spray to provide a minimum dry film thickness of 3.0 mils (0.076 mm).

B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

SECTION 05 5213

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails.

B. Free-standing railings at steps.

C. Other railings and guardrails shown on drawings.

1.02 RELATED SECTIONS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 04 2000 – Concrete Unit Masonry: Placement of anchors in masonry.

C. Section 04 2001 – Brick Masonry Veneer: Placement of anchors in brick masonry.

D. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.

1.03 REFERENCES

A. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; current edition.

B. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; current edition.

C. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; current edition.

D. SSPC-Paint 15 - Steel Joist Shop Paint; The Society for Protective Coatings; current edition

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E 985 and applicable local code.

B. Design railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set. Test in accordance with ASTM E 935.

C. Allow for expansion and contraction of members and building movement without damage to connections or members.

D. Dimensions: See drawings for configurations and heights.
   1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
   2. Intermediate Rails: 1-1/4 inches diameter, round.
   3. Posts: 1-1/4 inches diameter, round.

E. 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. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
   2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.
   3. For anchorage to stud walls, provide backing plates, for bolting anchors.
   4. Posts: Provide adjustable flanged brackets.

F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

A. Steel Pipe: ASTM A 53, Grade B Schedule 40, galvanized finish.

B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

C. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

D. Straight Splice Connectors: Steel concealed spigots.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

F. Finish: Field applied over galvanized finish.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure.

D. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.

E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-structural dimension lumber framing.
B. Roof-mounted curbs.
C. Roofing nailers.
D. Roofing cant strips.
E. Miscellaneous framing and sheathing.
F. Communications and electrical room mounting boards.
G. Concealed wood blocking, nailers, and supports.
H. Miscellaneous wood nailers, furring, and grounds.
I. Wall sheathing.

1.02 REFERENCE STANDARDS

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
C. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association.
D. PS 1 - Structural Plywood.
E. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce.
F. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc..

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
    1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

C. Provide wood harvested within a 500 mile radius of the project site.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.

B. Wall Sheathing: Oriented strand board structural wood panel with factory laminated water-resistive and air barrier layer.

C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.04 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

PART 3 EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Tack boards
   9. Wall paneling and trim.
   10. Joints of rigid wall coverings that occur between studs.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.

C. Wall Sheathing and Roof Sheathing with Laminated Water-Resistive Barrier and Air Barrier: Secure to studs as recommended by manufacturer.
   1. Install with laminated water-resistive and air barrier on exterior side of sheathing.
   2. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
   3. Use only mechanically attached and drainable EIFS and exterior insulation with wall sheathing with laminated water-resistive and air barrier.
   4. Apply manufacturer's standard seam tape to joints between sheathing panels. Use tape gun or hard rubber roller as recommended by manufacturer.

3.06 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.07 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood casings and moldings.

C. Hardware and attachment accessories.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1.

D. AWPA U1 - Use Category System: User Specification for Treated Wood.

E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

F. PS 1 - Structural Plywood.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

A. See Division 1 sections for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.
   2. Provide instructions for attachment hardware and finish hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

D. Samples: Submit two samples of finish plywood, 24 x 24 inch in size illustrating wood grain and specified finish.

E. Samples: Submit two samples of wood trim 18 inch long.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Company with at least one project within the past 5 years with value of woodwork within 20 percent of cost of woodwork for this project.
   2. Single Source Responsibility: Provide and install this work from single fabricator.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000 - Product Requirements.

C. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless indicated otherwise, and 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. (ALSC).

2.03 LUMBER MATERIALS

A. Hardwood Lumber: Plain sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish. Species as selected by Architect.

2.04 SHEET MATERIALS

A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

C. Hardwood Plywood: Veneer species as selected by Architect, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

2.05 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size and type to suit application.

C. Concealed Joint Fasteners: Threaded steel.

2.06 ACCESSORIES

A. Lumber for Shimming and Blocking: Softwood lumber of Douglas Fir species.

B. Primer: Alkyd primer sealer.

C. Wood Filler: Solvent base, tinted to match surface finish color.

2.07 WOOD TREATMENT

A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

C. Wood Preservative by Pressure Treatment (PT Type): Provide AWPA U1 treatment using waterborne preservative with 0.25 percent retainage.

D. Provide identification on fire retardant treated material.

E. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

F. Redry wood after pressure treatment to specified percent moisture content.

2.08 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.09 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. Finish: Polyurethane, water-based.
      b. Sheen: As selected by Architect.
   2. Opaque:
      a. System – Latex acrylic, water-based.
      b. Color and Sheen: As selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06 4100

ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated cabinet units.

B. Countertops.

C. Cabinet hardware.

D. Factory finishing.

E. Preparation for installing utilities.

1.02 REFERENCE STANDARDS

A. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

C. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

A. See Section 01 3000 – Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
   2. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards.
   3. Include certification program label.

C. Product Data: Provide data for hardware accessories.

D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.

E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
   2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Quality Certification: Provide AWI Quality Certification Program inspection report and quality certification of completed work.
   1. Provide labels or certificates indicating that the work complies with requirements of AWS Grade or Grades specified.
   2. Prior to delivery to the site provide shop drawings with certification labels.
   3. Provide labels on each product when required by certification program.
   4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
   5. Arrange and pay for inspections required for certification.
   6. Replace, repair, or rework all work for which certification is refused.

1.06 MOCK-UP

A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.

B. Locate where directed.

C. Mock-up may remain as part of the Work, if approved by the Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.08 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards for Custom Grade.

B. Wood Veneer Faced Cabinets: Custom grade.
   1. Exposed Surfaces: Grade A, White Oak, rift cut, slip-matched.
   2. Semi-Exposed Surfaces: Grade A, White Oak, rift cut, slip-matched.
   3. Concealed Surfaces: Grade B, Yellow Poplar, quarter cut, random-matched.

C. Plastic Laminate Faced Cabinets: Custom grade.

2.02 WOOD-BASED COMPONENTS

A. Hardwood Edgebanding: Use solid hardwood edgebanding matching species, color, grain, and grade for exposed portions of cabinetry.

2.03 LAMINATE MATERIALS

A. Manufacturers:
   1. Formica Corporation: www.formica.com.
   2. Panolam Industries International, Inc\Nevamar: www.nevamar.com.
   3. Wilsonart International, Inc: www.wilsonart.com.
   4. Substitutions: See Section 01 6000 – Product Requirements.

B. High Pressure Decorative Laminate (HPDL): Manufacturer, color and texture as scheduled in Finish Schedule on Drawings.

C. Provide types suitable to meet specified Custom Grade cabinet requirements.

2.04 COUNTERTOPS

A. Countertops are specified in Section 12 3600 - Countertops.

2.05 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Fasteners: Size and type to suit application.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel finish in exposed locations.

D. Grommets: Standard rubber grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE

A. General: BHMA A156.9 and as follows.
B. Standards and Brackets:
    1. Cabinet. Recessed Mounted.
        a. Pilaster Standards: #255.
        b. Brackets: #256,
        c. Finish: Steel/Aluminum, epoxy painted, color to match cabinet interior.
        d. Manufacturer: Knape & Vogt.
C. Cabinet Hinges
    1. Fully concealed adjustable cabinet hinges; self-latching, 170 degree opening, with mounting plates and accessories as required.
    2. Acceptable Products:
        a. Nexis 170 Grass America, Inc.
D. Cabinet Hinges
    1. Fully concealed adjustable cabinet hinges; self-latching, 90 degree opening for cabinet door adjacent to walls or limited 90 degree opening space.
    2. Acceptable Products:
        a. Nexis 95 by Grass America Inc.
E. Drawer and Cabinet Pulls:
    1. 3-1/2" aluminum pull.
    2. Acceptable Product: No. 4483-1/2 by Stanley.
F. Drawer Slide:
    1. Full extension slides for box, card file and utility drawers.
    2. Acceptable Product: No. 3932EC by Accuride.
G. Drawer Slide:
    1. Full extension slides for file drawers.
    2. Acceptable Product: No. C4034 by Accuride.
H. Touch Latch:
    1. Magnetic push latch.
    2. Acceptable Product: No. 245.61. by Hafele.
I. Drawer and Door Lock: No. 986 by Knape and Vogt.
J. Desk Grommet:
    1. MM6/Set – 2 ½” Solid Brass Desk Grommet 26D Satin Chrome by Mockett

2.07 SHOP TREATMENT OF WOOD MATERIALS

A. Provide UL approved identification on fire retardant treated material.

B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.08 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than

one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
   1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
   2. Cap exposed plastic laminate finish edges with material of same finish and pattern.

E. Matching Wood Grain: Provide vertical grain direction. Comply with requirements of quality standard for specified Grade and as follows:
   1. Provide sequence matching across each elevation.

F. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.

G. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.09 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

C. Finish work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:
   1. Transparent:
      a. System - 11, Polyurethane, Catalyzed.
      b. Stain: As selected by Architect.
      c. Sheen: Satin.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floor using appropriate angles and anchorages.

F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

A. Test installed work for rigidity and ability to support loads.

B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 1300
SHEET MEMBRANE WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet Waterproofing: Self-adhered modified bituminous sheet membrane.

1.02 REFERENCE STANDARDS

A. ASTM D5295/D5295M - Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems; 2018.

B. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for membrane.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.

C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.02 MEMBRANE MATERIALS

A. Self-adhesive Membrane Waterproofing.

B. Acceptable Product: Polyguard® 650 Membrane, 60-mil rubberized-asphalt membrane consisting of a high-density polyethylene film bonded to a layer of rubberized-asphalt.
   1. Substitutions: See Section 01 6000 - Product Requirements..

2.04 ACCESSORIES

A. Seaming Materials: As recommended by membrane manufacturer.

B. Membrane Sealant: As recommended by membrane manufacturer..

C. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.

D. Termination Bars: Aluminum; compatible with membrane and adhesives.

E. Adhesives: As recommended by membrane manufacturer.

F. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

C. Verify items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.

C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

D. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.

E. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.

F. Prepare building expansion joints at locations as indicated on drawings.

G. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

H. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.

1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.
2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, rutted cracks, ragged corners, deviations in surface plane, spalling and delaminations, as described in the reference standard.
3. Remove and replace areas of defective concrete as specified in Section 03 3000.
4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in the referenced standard.
5. Test concrete surfaces as described in the referenced standards. Verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.03 INSTALLATION - MEMBRANE

A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

B. Roll out membrane, and minimize wrinkles and bubbles.

C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.

D. Overlap edges and ends, minimum 3 inches, seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.

E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.

F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.

G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.

H. Seal membrane and flashings to adjoining surfaces.

3.04 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION

SECTION 07 2100

THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt thermal insulation..

B. Rigid insulation for use in exterior wall construction where noted on Drawings.

1.02 REFERENCE STANDARDS

A. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; current edition.

B. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; current edition.

1.03 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.04 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation in Metal Framed Roof/Ceiling Spaces: Batt insulation, thickness as designated on Drawings.

2.02 BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: Extruded polystyrene board, ASTM C 578-95, Type IV; with the following characteristics:
   1. Board Size: 16 x 96 inch.
   2. Board Thickness: As indicated on drawings.
   3. Board Edges: Square.
   4. Water Absorption: 0.1 percent by volume, maximum, when tested In accordance with ASTM C 272-91.
   5. Board Density: 1.6 lb/cu ft. minimum.
   6. Compressive Resistance: 25 psi minimum.
   7. Thermal Resistance per one inch thickness when aged 5 years:
      a. 75 degrees F: 5.6 minimum.
      b. 40 degrees F: 6.0 minimum.
   8. Flame Spread: 15.
   9. Smoke Developed: 165.

B. Acceptable Manufacturers:
   1. AFM Corp: www.r-control.com.
   2. Diversifoam Products: www.diversifoam.com.
   3. Grace Construction Products: www.na.graceconstruction.com.

4. Substitutions: See Section 01 6000 - Product Requirements

C. Acceptable Product:
   1. Styrofoam Cavitymate manufactured by Dow Chemical Company.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.03 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C 665; friction fit.
   1. Combustibility: Non-combustible, when tested in accordance with ASTM E 136.
   2. Thermal Resistance: R value indicated on drawings.
   3. Thickness: As required to achieve R-value.
   4. Facing, vinyl scrim, where designated on Drawings.
   6. Acceptable Manufacturers:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville Corporation: www.jm.com.
      c. Knauf Insulation GmbH: www.knaufinsulation.us.
      d. Owens Corning Corp: www.owenscorning.com.
   7. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

A. Tape: Bright aluminum self-adhering type, mesh-reinforced, 2-inch wide.

B. Tape joints of rigid insulation in accordance with roofing and insulation manufacturer's instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

A. Adhere a 6 inch wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
   1. Tape seal joints between sheets.
   2. Extend sheet full height of joint.

B. Apply adhesive to back of boards:
   1. Three continuous beads per board length.
   2. Full bed 1/8 inch thick.

C. Install rigid insulation directly to steel studs or exterior grade sheathing at 16 inches on center with manufacturer recommended mechanical fasteners, and tape joints with manufacturer's minimum 4 inch wide sealant tape; comply with ASTM E2357.

D. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

E. Extend boards over expansion joints, unbonded to wall on one side of joint.

F. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

G. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames, and tape seal in place to ensure continuity of vapor retarder and air seal.

H. Tape insulation board joints.

3.03 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Tape insulation batts in place.

F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

G. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

H. Tape seal tears or cuts in vapor retarder.

I. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

J. Coordinate work of this section with construction of air barrier seal specified in Section 07 2500.

3.03 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 4100

PREFORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This section covers the pre-finished, pre-fabricated Architectural metal wall panel system. All metal trim, accessories, fasteners, insulation and sealants indicated on the drawings as part of this section.
B. Drawings and general provisions of the Contract, including general and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 SUMMARY

A. Section Includes
    1. Factory formed metal wall panels
B. Related work specified elsewhere (Note: select from the below or add appropriate sections)
    1. Metal Roof Deck: Division 5 - Metal Deck Sections
    2. Wood Framing and Decking: Division 6 Roof Carpentry Section
    3. Flashing and Trim: Division 7- Flashing and Sheet Metal
    4. Coping and Gravel Stops: Division 7 Roof Specialties and Accessories
    5. Sealants: Division 7 Joint Sealers Sections

1.3 Definitions

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal, and accessories necessary for a complete weathertight system.

1.4 QUALITY ASSURANCE

A. Petersen Aluminum Corp, Tyler, TX, 800-441-8661Petersen Aluminum Corp, Phoenix, AZ, 833-750-1935 products establish a minimum of quality required.
B. Manufacturer and erector shall demonstrate experience of a minimum of five (5) years in this type of project.
C. Sheet Metal Industry Standard: Comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) *Architectural Sheet Metal Manual.*
D. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.

1.5 SUBSTITUTIONS

A. The material, products and equipment specified in this section establish a standard for required function, dimension, appearance and quality to be met by any proposed substitution.

1.6 SYSTEM DESCRIPTION

A. Material to comply with:
    1. ASTM A792/A792M Standard Specification for Sheet Steel, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip process

1.7 WALL PANEL SYSTEM PERFORMANCE TESTING

A. General Performance: Metal wall panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
B. Panels to meet:
    1. Metal Wall or Metal Soffit System shall be designed to meet applicable Local Building Code and the Soffit System shall have been tested by the Manufacturer per ASTM E-330 and have the applicable Load Tables published from this Air Bag testing for negative loads.

1.8 WARRANTIES

A. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finish within specified warranty period.
    1. Exposed Panels Finish - deterioration includes the following:
        a. Color fading more than 5 hunter units when tested according to ASTM D 2244
        b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
        c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
    2. Warranty Period: 20 Years from the date of substantial completion
B. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition

1.9 SUBMITTALS

A. Furnish detailed drawings showing profile and gauge of exterior sheets, location and type of fasteners, location, gauges, shape and method of attachment of all trim locations and types of sealants, and any other details as may be required for a weather-tight installation.
B. Provide finish samples of all colors specified.
C. Shop drawings: Show fabrication and installation layouts of metal wall panels or metal soffit panels, details of edge conditions, panel profiles, corners, anchorages, trim, flashings, closures and accessories, and special details. Distinguish between factory and field-assembled work
D. Coordination Drawings: Plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installer of the items involved.
E. LEED Submittals
    1. Product data for Credit MR 4.1 and credit MR 4.2: Indicating the percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.

1.10 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instruction and lead time requirements to avoid construction delays.
B. Deliver components, sheets, metal wall panels and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
C. Unload, store and erect metal wall panels in a manner to prevent bending, warping, twisting and surface damage.
D. Stack metal wall panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness. Do not store metal wall panels in contact with other materials that might cause staining, denting or other surface damage.
E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.11 PROJECT CONDITIONS

A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal wall panel work to be performed.
B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PANEL DESIGN

A. General: Provide factory-formed metal wall panels designed for wall, soffit and fascia applications where a flush or flat appearance is desired. A round interlock leg and concealed fastening system act to improve the flush appearance while providing additional strength.
B. Wall panels shall be Flush Wall 12" widths with 1" height.
C. Panels to be produced Smooth - Factory Standard. Specifier note: Factory standard is smooth unless specified. Specifier Note: Depending on producing factory, panels may be specified with venting strips or perforated, aluminum panels only, for soffit applications. Check with local factory for capabilities.
D. Forming: Use continuous end rolling method. No end laps on panels. No portable rollforming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.

2.2 ACCEPTABLE MANUFACTURERS

A. This project is detailed around the metal wall product of Petersen Aluminum Corp, Tyler, TX, 800-441-8661Petersen Aluminum Corp, Phoenix, AZ, 833-750-1935 Flush Wall

2.3 MATERIALS AND FINISHES

A. Preformed metal panels shall be fabricated of 22 GA and shall be Herr-Voss corrective leveled for flat appearance.
B. Color shall be **STANDARD PAC-CLAD FINISH
C. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.
D. If Strippable coating to be applied on the pre-finished panels to the top side to protect the finish during fabrication, shipping and handling, film shall be removed before installation.
E. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer of their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.
F. Accessories/Fasteners: Fasteners shall be of type, material, size, corrosion resistance, holding power and other properties required to fasten miscellaneous framing members to substrates. Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the wall panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces, except at designed points of roof panel fixity
G. Substrate shall be Nailbase
H. Underlayment

1. 1. On all surfaces to be covered with metal wall panels, furnish and install a 40 mil "Peel & Stick membrane", required as outlined by metal panel manufacturer. Membrane to be a minimum of 40 mil thickness, smooth, non-granular, by one of the following manufacturers:
    a. W.R Grace "Ice & Water Shield"
    b. Cetco Strongseal
    c. Carlisle CCW WIP 300HT
    d. Interwrap Titanium PSU
    e. MFM Corp "Wind & Water Shield"
    f. Polyguard Deck Guard HT of Polyglas HT
    g. Tamko TW Tile and Metal Underlayment

I. Sealants
1. Provide two-part polysulfide class B non-sag type for vertical and horizontal joints or
2. One part polysulfide not containing pitch or phenolic extenders or
3. Exterior grade silicone sealant recommended by roofing manufacturer or
4. One part non-sag, gun grade exterior type polyurethane recommended by the roofing manufacturer.

2.4 FABRICATION

A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturerâ€™s standard product fabrication.
    1. Max panel length is 55'.
B. Fabricate components of the system in factory, ready for field assembly.
C. Fabricate components and assemble units to comply with fire performance requirements specified.
D. Apply specified finishes in conformance with manufacturerâ€™s standard, and according to manufacturerâ€™s instructions.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine alignment of structural steel and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation.
B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FASTENERS

A. Secure units to supports.
B. Place fasteners as indicated in manufacturer's standards.

3.3 INSTALLATION

A. Compliance: Comply with manufacturerâ€™s product data, recommendations and installation instructions for substrate verification, preparation requirements and installation.
B. Panels shall be installed plumb and true in a proper alignment and in relation to the structural framing. The erector must have at least five years successful experience with similar applications.
C. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation.

D. Provide uniform, neat seams.
E. Fasteners: Conceal fasteners where possible in exposed work. Cover and seal fasteners and anchors for watertight and leakproof installation.
F. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.

3.4 DAMAGED MATERIAL

A. Upon determination of responsibility, repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

3.5 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damage installed products. Clean installed products in accordance with manufacturer's instruction prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 07 52 00 – Modified Bituminous Membrane Roofing

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Installation of rigid foam roof insulation over prepared metal and structural concrete decks.

B. Installation of cover board over rigid foam roof insulation.

C. Installation of new mop-on and torched applied SBS modified bitumen roof system with reflective cap sheet.

D. Related membrane and penetration flashing.

1.2 RELATED SECTIONS

A. Section 01 22 00 - Unit Pricing

B. Section 07 60 00 - Sheet Metal Work

C. Section 07 71 00 - Roof Specialties

D. Section 07 72 00 - Roof Accessories

1.3 REFERENCES

A. FM 4470 – Approval Standard for Class I Roof Cover

B. ASTM C177 – Test for Thermal Conductivity of Materials

C. ASTM C1289-02 Type II, Class I, Grade 2 – Faced Rigid Cellular Polyisocyanurate Insulation

D. ASTM D41 – Asphalt Primer

E. ASTM E84 – Surface Burning Characteristics of Building Materials

F. ASTM E108 – Standard Test Methods for Fire Tests of Roof Coverings

G. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2001

H. FM 1-29 – FM Global Property Loss Prevention Data Sheet

I. FM DS1-28 – Design Wind Loads, Factory Mutual Research Corporation

J. FM 4450 – Approval Standard for Class I Insulated Steel Decks

K. U.L. 1256 – Standard for Fire Test of Roof Deck Construction

1.4 SUBMITTALS

A. Procedures for Submittals: Section 01 3300.

B. Product Data: Submit latest edition of manufacturer's roofing and base flashing specifications, including list of materials proposed for use, and manufacturer's data sheets for other products. Product data submittal to include at a minimum, roofing membrane, flashing membrane assembly, adhesives, primers, sealants, component, fasteners and accessories.

C. Shop Drawings:

1. Manufacturer's standard pre-printed details or the reproduction of architect's details will not be acceptable Shop Drawings.
2. Indicate complete project specific installation details of roofing and flashing, including flashing details, penetration details and accessories.
3. Include complete flashing detail for each flashing condition. Indicate flashing detail locations on roof plan.
4. Indicate complete installation details of tapered insulation, including identification of each insulation block, sequence of installation, layout, roof slopes, thicknesses, crickets and saddles.
5. Submit proposed fastening patterns for the field, perimeter and corners of each individual roof area in accordance with FM Global Data Sheet 1-29.

D. Samples: Submit 8 x 11 in. sample of roof membrane cap sheet with specified color.

E. Quality Control Submittals:

1. Warranty: Submit specimen copy of roofing contractor and roofing manufacturer's roofing warranty with Product Data submittal, including evidence of application for warranty.
2. Manufacturer's Reports:
   a. Concurrent with Shop Drawing submittal; submit roof manufacturer's review of Contract Documents, acceptance of applicator and warranty conditions.
   b. At completion of project, submit manufacturer's field quality reports of field inspections, including copy of manufacturer's final inspection punch list.
3. Certification:
   a. If roof insulation and cover board is not manufactured by the roofing manufacturer, submit roof manufacturer’s certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer’s system warranty.

F. Progress Schedule/Phasing Plan:

1. Include roof plan with layout of phasing, indicating amount of roof area included in each day's work.
2. Indicate dates for beginning and completing each activity.
3. Identify other related work affected by roofing work.

G. Materials Storage: Submit manufacturer’s written materials storage requirements for review.

H. Contract Closeout Submittals:

1. Maintenance Data: Compile and submit maintenance instructions in accordance with Division 1. Include complete manufacturer's instructions for periodic inspection and maintenance of roofing system, including precautions and warnings to prevent damage and deterioration to roofing system.

I. Warranties: Contractor to provide professionally framed copies of the contractor and roofing manufacturer’s warranties mounting such at the roof access point as designated by Owner.

1.5 QUALITY ASSURANCE

A. Applicator:

1. Roofing sub-contractor shall have the highest level of certification issued by the roofing system manufacturer prior to bidding of the Construction Contract and shall provide said letter stating such in along with the roofing related submittals.
2. This documentation shall demonstrate the roofing sub-contractor's experience for a minimum of 5 completed projects of similar size and type within the last 4 years.
3. The Owner reserves the right to reject any proposed roofing sub-contractors, based on the roofing sub-contractor's past performance on Dallas ISD projects. The General Contractor (Contractor), having the ultimate control of Project quality, shall ensure that the proposed roofing sub-contractor meets the Owner's experience criteria and has a positive performance record with the Owner. Should the Owner reject the proposed roofing sub-contractor, the Contractor will not receive an adjustment in the Contract Sum when procuring a roofing sub-contractor acceptable to the Owner's requirements.
4. Roofing sub-contractor shall maintain a permanent office within a reasonable distance of project site to satisfy Owner that projects can be properly serviced during warranty phase.

B. Regulatory Requirements: Class A fire hazard classification from a recognized independent testing laboratory.

C. Pre-Installation Conference:

1. Prior to the commencement of roofing related work, conduct a roofing related pre-installation conference at the project site.
2. Attendance: Architect, Contractor, project superintendent, roof foreman and roof manufacturer's technical representative.
3. Agenda:
   a. Methods of removing existing roofing and debris and controls required preventing damage to building.
   b. Maintaining water tightness of building during reroofing, including night seal procedures and temporary covering of deck openings.
   c. Review of previously approved submittals.
   d. Quality control.
   e. Roofing details and procedures.
   f. Critical work sequencing.
   g. Contractor’s proposed materials storage and set up locations.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original unopened containers or packages with labels intact and legible, including required fire resistance classification labels.

B. Store rolled goods on end on clean raised platforms with weather protective covering when stored outdoors. The manufacturer’s factory applied plastic wrap will not serve in, and of itself, as a weather protective covering. Manufacturer’s factory applied plastic wrap shall be removed if required to prevent condensation from forming in the respective stored materials. Adhere to manufacturer’s written jobsite storage requirements. All materials must be elevated above the surface, to permit water to flow below without contacting the materials and covered with a breathable tarp.

C. Provide continuous protection of materials against wetting and absorption; remove wet materials from project site.

D. Materials stored on roof levels for immediate use shall be:

1. Distributed to prevent concentrated loads that would impose excessive strain on deck or structural members.
2. Positively secured to prevent displacement by excessive wind forces.
3. Stored in a manner that is acceptable to roofing manufacturer and covered by a breathable tarp in good condition equivalent to the materials on the ground. All materials shall be elevated to permit drainage.

1.7 PROJECT CONDITIONS

A. Existing Conditions: Examine existing buildings and existing roofing to determine existing physical conditions that affect removal of existing roofing and installation of new roofing.

B. Environmental Requirements:

1. Apply roofing in dry weather.
2. Do not remove existing roofing and flashing in inclement weather or when a 25% or higher percentage of rain is forecasted by the local national weather service for the period of time that is planned for the installation of roofing on a given day.
3. Do not apply roofing when ambient temperature is below 40 degrees F.
4. Ensure roof deck is structurally sound and sufficiently rigid to support the live and dead load requirements of the construction traffic.

C. Protection:

1. Provide special protection or avoid heavy traffic on completed work when ambient temperature is above 80 degrees F.
2. Restore to original condition or replace work or materials damaged during handling of roofing materials.

D. Emergency Equipment: Maintain on-site equipment necessary to apply emergency temporary edge seal in the event of sudden storms or inclement weather.

E. Restrictions:

1. Comply with requirements of Division 1 on work restrictions of site.
2. The use of tobacco products on project site is prohibited.

1.8 SEQUENCING/SCHEDULING

A. Do not remove more existing roofing in one day than can be replaced with new roof membrane in the same day.

B. For each day's work, install complete roof system including flashings, penetrations and other materials required for a complete, watertight installation.

C. Coordinate removal and replacement of roofing with work of separate contractors installing work related to roof installation.

1.9 WARRANTIES:

A. Applicator: Furnish a 5-year warranty against leaks and defects in materials and workmanship.

1. Include repairs required to maintain roof and base flashing in a watertight condition and the repair of roofing deficiencies such as blisters even if such has not created a path for moisture entry into the roof system components and subject facility.
2. Make repairs at no expense to Owner.
3. Make repairs in accordance with roofing manufacturer's requirements with such roofing manufacturer inspecting such repairs and providing a letter certifying that all repairs have been properly performed with approved materials leaving all warranties in full effect.

B. Roof Manufacturer: Furnish a 20-year NDL total roof system warranty against leaks and defects in materials and workmanship.

1. Include agreement to maintain roof and base flashing in a watertight condition for period of warranty. Warranty coverage to include:
   a. Base ply materials, fasteners and adhesives.
   b. Roof membrane components and adhesives.
   c. All accessory products required for installation of membrane roofing system, including surface mastics, coatings, stripping plies, primers, and tapered edge and cant strips.
   d. Roof insulation.
   e. Warranty shall not exclude coverage as a result of winds less than 55 m.p.h.
   f. Make repairs at no expense to Owner.
   g. Monetary liability of warranty shall not be limited.

PART 2 - PRODUCTS

2.01 MANUFACTURER:

A. System specified for roofing is an SBS modified bitumen sheet roof system manufactured by Johns Manville and is listed as a standard of quality.

B. Other heat welded SBS systems by Soprema, Siplast, and GAF are listed as acceptable substitutions. These acceptable substitution roof systems shall include modifications and other accessories required by roof system manufacturer to provide same performance and warranty as specified.

C. Products furnished for roofing system shall be products of a single manufacturer.

D. Component products listed for roofing system are product names of Johns Manville, unless otherwise specified.

E. Comply with roofing system manufacturer's recommendations for component roofing system materials not listed in this specification.

Note: No "cold" application will be acceptable. No "aluminum" clad base flashings are acceptable. Also note, a 4-hour fire watch will be required.

2.02 ROOFING SYSTEM - OVER INSULATION:

A. Qualities: Torch applied multi-ply SBS modified bitumen roofing, consisting of an unsurfaced SBS sheet and reflective mineral surfaced SBS cap sheet, applied over cover board.

B. Roofing System Performance Requirements:
   1. Solar Reflectance Index (SRI) for exposed roofing: 78, minimum, calculated in accordance with ASTM E 1980.
      a. Field applied coating may not be used to achieve specified SRI.
   2. External Fire Exposure Classification: ASTM E108 Class A, UL or Warnock Hersey listed.
   3. Wind Resistance Classification: Factory Mutual 1-90, in accordance with FM DS 1-28.
   4. Source: Specification 2FID by Johns Manville consisting of base sheet, one layer of DynaBase HW and one layer of DynaKap FR T1 HW CR G is basis of design.
   5. Product rated ID #0662-0042c.
      a. Reflectivity: Initial – 0.70; 3-year – 0.65.
      b. Emissivity: Initial – 0.90; 3-year - 0.91.

2.03 ROOF FLASHING MEMBRANES:

A. Flashing: 2 ply system with reflective surfaced SBS cap sheet applied over a base sheet.
   1. Base Ply: Unsurfaced base ply sheet. Product: DynaBase HW by Johns Manville.
   2. Top Sheet: DynaKap FR T1 HW CR G by Johns Manville.

B. Penetration Flashing:
   1. Liquid Applied Flashing: A liquid and fabric reinforced flashing system created with a stitchbonded polyester scrim and a two-component, moisture cured, elastomeric, liquid applied flashing material, consisting of an asphalt extended urethane base material and an activator. Product: PermaFlash System
   2. Product: PermaFlash System by Johns Manville.

C. Joint Sealants: Refer to Section 07 92 00.

2.04 ROOF INSULATION:

A. General: Preformed roof insulation boards manufactured or approved by modified bitumen roofing manufacturer.

B. Rigid Foam Roof Insulation:
   1. Qualities: Rigid closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers:
      a. Thicknesses: As indicated in Drawings.
      b. Size: 48 in. x 48 in. maximum.
      c. R Value: R-30 minimum, LTTR Method.
      d. UL Rating: Class A.
      e. Complies with Factory Mutual 4450 or U.L. 1256 for use directly over metal roof deck without separate thermal barrier.
   2. Standards:
      a. Overall Product: ASTCM 1289-02, Type II, Class I, Grade 2
      b. Fire Hazard: ASTM E84.
      c. Thermal Conductance: ASTM C177.

C. Tapered Rigid Foam Roof Insulation:
   1. Qualities: Same as rigid foam roof insulation board.
      a. Tapers: As indicated on Drawings.
      b. Minimum Thickness: As indicated on Drawings.
   2. Standards: Same as rigid foam roof insulation board.

2.05 ROOF INSULATION COVER BOARD:

A. Cover Board:
   1. Qualities: Primed, fiberglass faced gypsum coverboard. No cellulose content.
      a. Thickness: 1/2 inch.
      b. Size: Nominal 4 x 4 ft.
      c. Source: Georgia Pacific: DensDeck Prime.

2.06 RELATED MATERIALS:

A. Asphalt Primer: ASTM D41.

B. Asphalt Bitumen: ASTM D312, Type IV.

C. Roofing Cement: ASTM D4586, Type II; asbestos free; Bestile Industrial Roof Cement by Johns Manville.

D. Fasteners - General:
   1. Nails: Non-ferrous, cement-coated, or galvanized fasteners approved by roofing manufacturer.
      a. Self-Clinching Nails: (Lightweight Insulating Concrete) Zonolite base ply fastener, (Nail-Tite MK III), by ES Products, Inc., or Soprema Base Sheet Fasteners, type and size as recommended by manufacturer.

E. Fasteners – Roof Insulation:
   Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions set forth in FMG 4470, designed for fastening roof insulation to substrate as supplied or approved by roof manufacturer in writing.

F. Roof Drain Flashing: 4 lb. sheet lead, 30 x 30 in.

G. Roof Walkway: Additional ply of specified SBS cap sheet.

H. Fiber Cants and Tapered Edge Strips: Asphalt impregnated preformed fiberboard or preformed perlite fiberboard.

I. Metal Termination Bar: 1/8 x one inch aluminum bar pre-drilled or punched for fasteners at 6 in. o.c.

J. Synthetic Chips: Synthetic chips to match the factory applied reflective surfacing of the finish ply cap sheet.

K. Polyurethane Foam Adhesive: INSTA-STIK Professional Roofing Adhesive by Dow Chemical, Inc., or other approved adhesive by membrane manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that work penetrating roof deck has been completed.

B. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture and unevenness. Verify and ensure that no coring compound is present on the concrete deck. If curing compound is present, concrete surface shall be bead blasted to remove all curing compound residue. If deck contains any moisture, preventing adhesion, contractor shall use a moisture curing adhesive to adhere the first layer of insulation at no additional cost to the owner.

C. Confirm that roof openings and deck penetrations are located to allow for them to be properly flashed, that roof drains are installed at the designated elevations and secured in place and that blocking, curbs and wood nailers are properly installed. Proceed only when conditions are acceptable to manufacturer. Overflow drains are not to be within sumps.

D. Do not proceed until defects are corrected.

3.02 PREPARATION

A. Priming: Prime metal, concrete and masonry surfaces with asphalt primer.

B. Cleaning:
1. Verify that debris has been completely removed.
2. Clean roof deck immediately prior to roofing application.
3. Prevent materials from entering and clogging roof drains and piping.

3.03 APPLICATION – ROOF INSULATION OVER SLOPED STRUCTURAL CONCRETE DECK – FULLY ADHERED

A. General:
1. Install insulation with longitudinal joints, continuous straight lines with end joints staggered at 24 inches minimum.
2. Neatly cut and fit insulation around penetrations and at roof perimeters. Any gaps in insulation exceeding 1/4 inch in width shall be filled with insulation.
3. Install no more insulation at one time than can be roofed on the same day. Any insulation left exposed at the end of the workday, or which is exposed to water, shall be removed and discarded with no exceptions.
4. Install temporary water cut-offs at completion of each day's work and remove such upon resumption of work.
5. Verify that concrete deck is dry, free of moisture and approved by manufacturer for installation of insulation. If concrete deck is not fully dry, contractor shall use a moisture cured urethane adhesive at no additional cost to the owner.

B. Fully Adhered Rigid Insulation:
1. Fully adhere bottom layer of rigid foam insulation in low rise foam adhesive applied in ribbons spaced to meet uplift resistance requirements. Install insulation with longitudinal joints in continuous straight lines, with end joints staggered at 24 inches minimum. Any gaps in insulation exceeding 1/4 inch in width shall be filled with insulation.
2. Fully adhere subsequent rigid foam insulation layers with low rise foam adhesive applied in ribbons spaced to meet uplift resistance requirements as scheduled with joints being staggered in relation to the base layer of rigid foam insulation and between layers. Any gaps in insulation of 1/4-inch or greater in width shall be filled with insulation.
3. Fully adhere scheduled tapered insulation for crickets with EVT steep asphalt applied at 20 lbs. per square in accordance with approved tapered insulation shop drawings with each layer being staggered in relation to the layer below.

C. Gypsum Cover Board:
1. Fully adhere gypsum cover board with low-rise foam adhesive with bead spacing in accordance with the approved adhesive patterns for the field, perimeters and corners for each roof area in accordance with roofing manufacturer's requirements and ASCE 7-10. Coverboard shall be staggered 12 inches in relation to the layer below.

3.04 APPLICATION – ROOF INSULATION OVER SLOPED STEEL DECK – MECHANICALLY ATTACHED AND ADHERED

A. General:
1. Install insulation with longitudinal joints, continuous straight lines with end joints staggered at 24 inches minimum.
2. Neatly cut and fit insulation around penetrations and at roof perimeters. Any gaps in insulation exceeding 1/4 inch in width shall be filled with insulation.
3. Install no more insulation at one time than can be roofed on the same day. Any insulation left exposed at the end of the workday, or which is exposed to water, shall be removed and discarded with no exceptions.
4. Install temporary water cut-offs at completion of each day's work and remove such upon resumption of work.
5. Verify that concrete deck is dry, free of moisture and approved by manufacturer for installation of insulation. If concrete deck is not fully dry, contractor shall use a moisture cured urethane adhesive at no additional cost to the owner.

B. Mechanically Attached and Fully Adhered Rigid Insulation:
1. Mechanically secure insulation to metal deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type according to manufacturer's requirements for specified uplift requirements. Ensure fasteners will penetrate the top flute of the deck 3/4 inch minimum but will not penetrate the bottom flute, spaced to meet uplift resistance requirements. Install insulation with longitudinal joints in continuous straight lines, with end joints staggered at 24 inches minimum. Any gaps in insulation exceeding 1/4 inch in width shall be filled with insulation.
2. Fully adhere subsequent rigid foam insulation layers with low rise foam adhesive applied in ribbons spaced to meet uplift resistance requirements as scheduled with joints being staggered in relation to the base layer of rigid foam insulation and between layers. Any gaps in insulation of 1/4-inch or greater in width shall be filled with insulation.
3. Fully adhere scheduled tapered insulation for crickets with EVT steep asphalt applied at 20 lbs. per square in accordance with approved tapered insulation shop drawings with each layer being staggered in relation to the layer below.

C. Gypsum Cover Board:
1. Fully adhere gypsum cover board with low-rise foam adhesive with bead spacing in accordance with the approved adhesive patterns for the field, perimeters and corners for each roof area in accordance with roofing manufacturer's requirements and ASCE 7-10. Coverboard shall be staggered 12 inches in relation to the layer below.

3.05 TORCH APPLICATION OF SBS MODIFIED BITUMEN ROOFING BASE SHEET AND TORCH APPLICATION OF CAP SHEET:

A. General:
1. Membrane application: Apply roofing in accordance with roofing manufacturer's instructions and as detailed and specified herein.
2. Unroll roof base and cap sheet and allow to fully relax prior to installation.
3. Aesthetic considerations: An aesthetically pleasing overall appearance of the finished roof system will be required prior to the work being accepted. Numerous patches and other repairs that will be sight exposed after the installation of the roof system has been completed will not be acceptable.

B. Roofing Membrane – Torch Application of Base Ply:
1. Install in accordance with roofing manufacturer's specifications, and as specified below.
2. Lay sheets at right angles to slope of deck.
3. Extend field of roof base ply to the top of the cant minimum, and 2 inches maximum above the top of the cant.

4. Torch apply unsurfaced base sheet to substrate lapping sides a minimum of 3 inches and ends a minimum of 6 inches. Stagger end laps a minimum of 3 ft. Prevent traffic of all types from ply sheets until asphalt has cooled to 50 degrees below EVT.
5. Torch apply unsurfaced base sheet base flashing vertically, 36 inch maximum exposure, lapping edges a minimum of 3 inches. Base flashing shall extend 14 inches above the roof surface minimum and 4 inches onto roof surface. Extend base flashing over the top of roof curbs and terminate. Stagger laps of base flashing 6 inches minimum from laps of field membrane. Prevent traffic of all types from ply sheets until asphalt has cooled to 50 degrees below EVT.
6. Prior to the installation of the cap sheet, inspect the roof with the owner, contractor, roofing contractor, roofing manufacturer and owner's third-party consultant. Address all deficiencies in base sheet application prior to the installation of the cap sheet.

C. Roofing Membrane – Torch Applied Cap Sheet:
1. Install in accordance with roofing manufacturer's specification, and as specified below.
2. Phased construction of roofing membrane is strictly prohibited, unless specifically approved by roofing manufacturer.
3. Lay sheets at right angles to slope of deck.
4. Extend field of roof cap sheet to the top of the cant minimum, and 2 inches maximum above the top of the cant, and fully degranulate from the top of the cap sheet to 4 inches beyond the toe of the cant.
5. Heat weld cap sheet over unsurfaced ply membrane, lapping sides a minimum of 3 inches and ends a minimum of 6 inches. Fully degranulate for end laps, cap sheet as required prior to beginning the next sheet. Stagger laps between plies a minimum of 36 inches. Heat weld in accordance with manufacturer's recommendations. Avoid asphalt seepage greater than 1/2 inch at seams. Check lap seams using edge of a hot trowel. Correct defects.
6. Heat weld base flashing cap sheet vertically, 36 inch maximum exposure, over unsurfaced base flashing and fully degranulated ply membrane, lapping sides a minimum of 3 inches and ends a minimum of 6 inches. Fully degranulate where selvedge edge is not exposed prior to beginning the next sheet. Stagger laps between field laps a minimum of 6 inches. Heat weld in accordance with manufacturer's recommendations. Avoid asphalt seepage greater than 1/2 inch at seams. Check lap seams using edge of a hot trowel. Correct defects.
7. Granule Embedment: Broadcast approved granules into asphalt seepage during installation of cap sheet while bitumen is still hot.
8. Complete application of roofing system without pockets, blisters, wrinkles or fish mouths.
9. Complete installation of roofing system up to line of termination of day's work. Install temporary water cut-offs of asphalt or plastic cement and fiberglass felts at end of each day's work. Remove upon resumption of work.
10. Ponding Water: Areas which pond water in excess of the roofing system manufacturer's definition of acceptable standing or ponding water, shall be corrected by adding additional layers of modified bitumen base ply or by adding a coating to the mineral surfaced cap sheet in accordance with the roofing system manufacturer's written instructions in order eliminate any conditions that will result in a warranty exclusion. The installation of an additional 1,000 s.f. of base ply is to be included in the Base Bid with the actual cost for additional base ply being adjusted on the basis of unit pricing.

D. Base Flashing:
1. Install 2 ply system consisting of unsurfaced ply sheet and mineral surfaced cap sheet in accordance with requirements of roofing system manufacturer, with each ply sheet extending full height of flashing to 14 inches minimum and 30 inches maximum above the finished roof surface.
2. Mechanically attach leading/top edge of flashings with continuous termination bars with fasteners installed at 6 inches on center.
3. Install where indicated and where roofing system abuts vertical surfaces and at curbs.

4. Extend base flashing up rise walls and parapet walls as indicated, with such flashings being extended onto the field of the roof in accordance with the manufacturer's requirements.

E. Liquid Applied Penetration Flashing:
1. Install penetration flashings at scheduled penetrations as detailed in accordance with manufacturer's directions.
2. Prepare metal surfaces by sandblasting to bare metal or as otherwise required by roofing manufacturer. Prime all metal surfaces with manufacturer's recommended primers.
3. Install liquid flashing in a layered application with scrim cloth reinforcing.

F. Roof Drains:
1. Extend roof membrane into roof drain and flash with lead flashing and membrane in accordance with manufacturer's directions.
2. Securely tighten clamping rings and securely install strainers. Replace damaged, missing or plastic roof drain strainers with painted cast iron strainers properly sized for each subject roof drain.

G. Roof Walkways: Adhere an additional ply of modified bitumen cap sheet over the surface of the finished modified bitumen cap sheet in accordance with the manufacturer's requirements. Install walkways around three sides of all roof hatches, below doors providing access to roof areas, on each side of roof access ladders installed to provide access from one roof area to another and around all rooftop equipment requiring periodic maintenance. Provide one-inch gaps between walkways at a maximum of 6 ft. on center or as otherwise approved.

3.06 FIELD QUALITY CONTROL

A. Manufacturer's Field Service:
1. Attend pre-installation conference.
2. During installation provide one on-site inspection for each 10,000 s.f. of roofing by qualified technical representative employed by roofing manufacturer with such inspections being evenly spaced during the base ply and cap sheet installation.
3. Upon completion of installation of the base ply, provide weekly inspections by a technical representative of roofing manufacturer to confirm that base ply has been installed in accordance with manufacturer's requirements. Issue roofing manufacturer's interim inspection document noting any deficiencies that need to be addressed prior to the cap sheet being installed.
4. Upon completion of roof system installation, provide a final inspection by a technical representative of roofing manufacturer to confirm that roofing system has been installed in accordance with manufacturer's requirements. Issue the roofing manufacturer's final completion checklist to Architect and Owner for review.

B. Provide one copy of the roofing manufacturer's Final Inspection Report to Owner, Architect and Owner's third-party consultant within 2 calendar working days from the date of the Final Inspection having been completed.

C. Contractor shall have copies of their roof warranty and the roofing manufacturer's warranty professionally mounted and framed installed near the main access point to the roof as designated by Owner.

D. Ponding Water: Prior to the installation of the roofing system cap sheet, additional plies of the modified bitumen base sheet shall be applied to address any areas that will pond water in excess of the 48 hour manufacturer's requirements or by adding a coating to the mineral surfaced cap sheet in accordance with the roofing system manufacturer's written instructions in order eliminate any conditions that will result in a warranty exclusion. This shall be done at no additional cost to the Owner. Contractor to monitor ponding and record readings every 2 hours or when conditions change. Contractor will have records available for review by owner.

E. Following is a list of the DISD's Habitual Punch List items as they relate to this project:

1. All roof system base flashings shall be a minimum of 14 inches, or as indicated, above adjacent finish roof elevation. The height of all roof curbs should take this requirement into consideration.

2. Provision of soldered corners on counter flashings installed at roof curbs. Installation of properly sized roof curbs.

3. Provision of soldered joints on all through wall scuppers. Continuous sealant installed on scupper escutcheon plates.

4. Installation of properly sized pipe supports for all roof level piping at 8 ft. o.c. maximum in linear direction and within 2 ft. of each change in direction. Provide pipe supports with rollers for all piping 1.25 inches or greater in diameter. All pipe supports are to be installed over an additional ply of modified bitumen cap sheet as protection pas.

5. Provision of non-damaging pads for all equipment installed directly on roof.

6. Provision of temporary roof protection by trades performing work over roof system. Limit storage of materials on roof.

7. Roof system base flashings shall not have aluminum cladding.

8. No penetrations through base flashings unless resin flashings for such are approved by roofing manufacturer.

9. Installation of resin flashings in lieu of pitch pans or metal penetration dams at piping and conduit penetrations. All piping and conduit penetrations must be hard pipe or conduit and shall be properly anchored to deck.

10. Refrigerant line penetrations. Membrane to be peeled at refrigerant line penetration to determine flashing and sealed.

11. Avoid damage to roof from cutting oils, refrigerant oils, soldering, etc.

12. Provision of overflow provisions in conductor heads.

13. Provision of through-wall flashings with weeps at all masonry rise walls that occur above roofing.

14. Provision of minimum 14 inch high roof system base flashings below windows that occur above roofing.

15. Overflow drains shall have their inlet elevations set at 2 inches above the inlet elevation for the primary roof drains.

16. Ponding water 48 hours after rain is unacceptable.

17. New and replaced roof drain strainers to be metal not plastic.

18. Verify all roof drains and overflow drains, through wall scuppers and downspouts are open and in functioning order.

19. All gas legs should have 1 inch clearance from finish roof elevation.

20. Turn in all lead flashings at plumbing stocks a minimum of 1 inch.

21. Precast concrete splash blocks are required at locations where a given roof area discharges storm water onto a roof system.

22. All condensing units are to be installed on pre-manufactured roof curbs with sheet metal curb caps.

23. Where required sumps are to be provided at all roof drains.

24. Roof penetrations shall not occur within 18 inches of any roof system base flashings.

25. Gutter expansion joints should be every 50ft. maximum or as otherwise required.

26. Roof to roof ladder supports must not penetrate copings. Any supports occurring in the roof system base flashings must be flashed with resin flashings.

27. Clamping rings at drains must be properly secured.

28. All fastener spacing should be 8 in. o.c. maximum.

29. No stepping through wall flashings and base flashings – be consistent.

30. Provide isolation at support clamps for where dissimilar metals occur.

31. All roof level gas piping shall be primed and painted.

32. Rise wall base flashings must not cover weep holes installed above thru wall flashings.

33. Three course flashing and term bar anchored at 6 in. o.c. to be installed at all base flashings.

34. At all cap sheet installations, a maximum of one patch per membrane roll shall be considered acceptable.

3.07 CLEANING AND PATCHING

A. Clean up debris, excess materials and equipment and remove from site.

B. Remove drippage or spills of coatings, sealant, mastic or primers from finish surfaces.

C. Patch misaligned or inadequately lapped seams, inadequately adhered areas, punctures or other damage to membrane with a patch of membrane sheet that extends at least 6 inches in each direction from deficiency.

3.08 PROTECTION

A. Provide special protection and avoid heavy traffic on completed work. Protect roofing system from damage and wear during the remainder of construction period.

B. Restore to original condition or replace work or materials damaged during handling of roofing materials.

C. Ensure no cutting or threading of pipe occurs on the roof at any time during the project. Ensure the roof is protected while any pipe is being soldered.

END OF SECTION

SECTION 07 60 00

SHEET METAL WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Shop or field-formed sheet metal work for moisture protection including edge strips, metal edging, flashing, counterflashing, scuppers, conductor heads, roof penetration flashing, duct penetration flashing, metal penetration dams, gutters and downspouts.

B. Related accessories.

1.2 RELATED SECTIONS

A. Section 07 52 00 - Modified Bituminous Membrane Roofing.

B. Section 07 59 00 - Minor Roof Renovation Work.

C. Section 07 71 00 – Roof Specialties.

D. Section 07 72 00 - Roof Accessories.

E. Section 07 92 00 - Joint Sealants: Sealants.

1.3 REFERENCES:

A. Stainless Steel: ASTM A167, Type 302/304 Soft Temper No. 4 finish, gauge as indicated.

B. Galvanized Steel: ARMCO Zincgrip Paintgrip ASTM A526 commercial quality, coating designation G90, ASTM A525, gauge as indicated.

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2000, gauge as indicated.

D. ASTM B32 - Solder Metal.

E. FS FF-S-325 - Shield Expansion; Nail, Expansion; and Nail, Drive-Screw.

F. (SMACNA) - Architectural Sheet Metal Manual, 7th Edition, 2012.

1.4 SUBMITTALS

A. Procedures for Submittals: Section 01 3300.

B. Product Data: Manufacturer's product data sheets for each product.

C. Shop Drawings:
   1. Submit Shop Drawing of each fabricated item of sheet metal.
   2. Indicate joints, types and locations of fasteners, shapes, sizes, expansion joints, special conditions, and installation details.
   3. Reproduction of architect’s details will not be allowed.

D. Samples: Submit following samples:
   1. Two 6-inch sq. samples of each sheet metal material.
   2. Two 12-inch sq. samples of prefinished sheet metal with specified color and finish.

1.5 WARRANTY

A. Provide Owner a written warranty which shall warrant sheet metal work to be free of leaks and defects in materials and workmanship for 5 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIAL

A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; gauge as scheduled.

B. Prefinished Sheet Metal: ASTM A446, Grade A or ASTM A526, coating designation G90, ASTM A525, gage as indicated, prefinished on a continuous coil coating line with a fluoropolymer coating based on Kynar 500 resin, standard color selected by Architect.

C. Stainless Steel: ASTM A 666 Type 304, soft temper, 0.025 inch thick; smooth No. 4 finish.

2.2 RELATED MATERIAL

A. Nails: Galvanized steel material, flathead, wire, barbed, slating type. For washers, use lead or neoprene.

B. Screws: Self-tapping sheet metal type.

C. Rivets: Cadmium plated material, type and size as recommended by sheet metal manufacturer.

D. Concrete Fasteners: Round-head stainless steel screw and neoprene washer with lead expansion anchor, FS FF-S-325, Group IV, Type 2. Rawlplug by The Rawlplug Co.

E. Sealant: As specified in Section 07 5900.

F. Solder: ASTM B32, allow grade 58, 50% lead.

G. Flux: Phosphoric acid type, manufacturer's standard.

J. Self-Adhering Underlayment: Grace Ice & Water Shield HT 40 mil thick self-adhering roofing underlayment for high temperature applications or equivalent approved product.

2.3 FABRICATION - GENERAL

A. Fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and reviewed Shop Drawings.

B. Edge Design: Fabricate and install roof edge flashing that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist roof edge design pressure (P) calculated according to ANSI/SPRI-ES-1 using ASCE 7-10 methodology.

C. Form sheet metal on bending brake.

D. Shape, trim and hand seam metal on bench insofar as practicable.

E. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

F. Form materials with straight lines, sharp angles and smooth curves.

G. Fold back edges on concealed side of exposed edge to form hem.

H. Weld or solder joints on plain galvanized sheet metal parts that are to be permanently and rigidly assembled.

2.4 FABRICATED ITEMS

A. Edge Strips: 1-1/4 inch continuous strips, fabricated out of galvanized sheet metal.

B. Copings: Should contractor choose to manufacture their own copings in accordance with ANSI SPRI-ES1: fabricate such out of sheet metal type and gauge as indicated.
   1. Sheet metal type and gauge as indicated, formed in maximum 10 ft. lengths; colors as selected.
   2. Provide joint system in accordance with SMACNA Table 3-1, J4; Butt Seam with Backup Plate.
   3. Provide mitered and riveted corners, sealed.
   4. Each section of 10ft. length shall be stamped for ES-1 compliance.

C. Flashings, Counterflashings and Misc: 24 gage galv. sheet steel, or stainless steel as indicated on drawings formed in minimum 10 ft. lengths.
   1. Two piece system with metal flashing receiver at walls, SMACNA Figure 4-3.
   2. One piece system at curbs as indicated.
   3. One piece surface applied reglet/counterflashing receiver with formed top rabbet for sealant where indicated.

D. Thru-Wall Flashing at Masonry Walls: Sheet metal and gauge as indicated formed in maximum lengths possible formed as detailed.

E. Miscellaneous Metal Fabrications: Sheet metal and gauge as indicated; formed as shown.

F. Hung Gutters: Fabricate as indicated with profile similar to SMACNA Style A. Provide 1 inch wide gutter brackets as shown with hemmed edges. Provide butt type gutter expansion joints where indicated but at not more than 50 feet on center as indicated, similar to SMACNA FIG 1-7.

G. Butt Type Gutter Expansion Joints: Type of sheet metal and gauge as indicated, formed as indicated.

H. Downspouts:
   1. Sheet metal type and gauge as indicated; colors as selected.
   2. Outlet Thimble: metal with upper section telescoped into lower sections minimum of 3 inch, similar to SMACNA Figure 1-33, Detail 2.
   3. Lower Sections: Prefinished sheet metal formed as indicated, similar to SMACNA Figure 1-32B.
   4. Gutter Brackets: Prefinished sheet metal formed to match existing.

I. Overflow Scuppers and Conductor Heads: Fabricate scuppers as indicated similar to SMACNA FIG 1-30A and FIG 1-30B with 22 gage prefinished sheet metal, color as selected. Fabricate conductor heads as indicated similar to SMACNA FIF 1-27A.

J. Metal Edge, Fascias, and Related Flashings:
   1. Prefinished sheet steel formed in minimum 10 ft. lengths.
   2. Provide joint system in accordance with SMACNA Figure 2-5, Figure A - cover plate.

K. Duct Penetration Flashing: 24 gage galvanized sheet steel construction, fabricated as detailed, with joints fully soldered and with edges hemmed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrates are smooth and clean to extent needed for sheet metal work.

B. Verify that reglets, nails, cants, and blocking to receive sheet metal are installed and free of concrete and soil.

C. Do not start sheet metal work until conditions are satisfactory.

3.2 INSTALLATION

A. General:
   1. Install work watertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
   2. Install fabricated sheet metal items in accordance with SMACNA Architectural Sheet Metal Manual.
   3. Coat contact surfaces of dissimilar metals with zinc chromate paint.

B. Edge Strip: At exposed edges of copings (if such are shop fabricated rather than pre-manufactured) attach continuous edge strip, nailed at 4 in. o.c.

C. Copings at Parapet Walls:
   1. Fabricate in minimum 10 ft. lengths where possible.
   2. Install high temperature underlayment over wood blocking to make a continuous envelope from air/weather barrier to the roof membrane.
   3. Install galvanized steel cleat over wood nailers as shown.
   4. Install approved sealant over fasteners used to anchor to wood nailers.
   5. Fasten bottom drip edge of face to edge strip.
   6. Install fasteners with rubber washers on interior face of coping to secure such to wood nailer.
   7. Seal joints in prefinished metal with sealant.
   8. Provide for expansion at 20 ft. o.c. maximum.

D. Counter Flashings:
   1. Two-Piece System:
      a. Rake existing mortar joints to a depth of 1 inch.
      b. Insert springlocked reglet receiver in raked mortar joints.
      c. Secure receiver in place with plastic wedges installed at 8 inches on center maximum or as required to provide two wedges per section of counter flashing.
      d. Install sealant in exposed joints.

2. One Piece System:
    a. Install at curbs as indicated providing fasteners spaced at 12 inches on center or as required to provide 2 fasteners for each section of counter flashing.
    b. Provide 3 inch overlap joints sealed with two rows of sealant.

E. Thru-Wall Flashing/Receiver:
1. Install thru-wall flashing/receiver as indicated at locations where existing brick is being removed to accommodate the installation of minimum 8 inch high roof system base flashings:
    a. Install thru-wall flashing as shown.
    b. Fabricate in maximum lengths possible.
    c. Overlap end joints 3 inches and seal with two rows of sealant.
    d. Flash vertical leg into existing damproofing, if present, using compatible materials.
    e. If damproofing is not present report such to Architect and await further instructions.

F. Miscellaneous Fabrications:
1. Install as indicated; soldering joints where indicated; flashing as shown.

G. Hung Gutters:
1. Install as detailed anchoring to wood nailers at 4 inches on center staggered.
2. Install 22 gauge prefinished sheet metal 1 inch wide hemmed gutter brackets at 3 feet on center.
3. Install gutter expansion joints as detailed at locations indicated.

H. Downspouts:
1. Install downspout thimble, sealed and riveted.
2. Telescope upper sections into lower sections; riveted and sealed.
3. Install plumb and level, with 3 - 2 inch wide prefinished sheet metal straps evenly spaced as follows:
    a. 12 inches from the underside of the guttering.
    b. 12 inches from the bottom discharge point of the downspout.
    c. In the middle of the lower and upper brackets.
    d. Installation of straps shall be uniform when viewed from an elevational perspective.

I. Overflow Scuppers and Conductor Heads: Install with joints fully sealed. Extend flanges as shown in each direction. Install sealant between flanges and wall surfaces and between conductor heads and wall

J. Duct Penetration Flashing: Install as indicated over curbed duct penetration. Seal connections between flashing and ducts. Solder joints in flashing. Secure flanges with neoprene washer screws through slotted holes. Install roofing manufacturer's resin flashings at overflow scupper sleeves.

3.3 CLEANING:

A. Leave work clean and free of stains, scrap, and debris.

END OF SECTION 76 00 00

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, coping, sheet metal roofing, and prefinished break metal.

B. Sealants for joints within sheet metal fabrications.

C. Reglets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 5200 - Modified Bituminous Membrane Roofing: Flashing used in roofing.

B. Section 07 7100 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.

C. Section 07 7200 - Roof Accessories: Manufactured metal roof curbs.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

E. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

G. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Division 1 sections for submittal procedures

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Samples: Submit two samples 12x12x inch in size illustrating metal finish color.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

1.08 WARRANTY

A. Provide Owner with a written warranty which warrants sheet metal work to be free of leaks and defects in materials and workmanship for 5 years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A635M, with G90/Z275 zinc coating , minimum 24 gage thick base metal. Furnish ARMCO Zincgrip Paintgrip at items indicated to be field painted. Thickness: As indicated on Drawings. Zincgrip to be painted where visible.

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system, color as selected by Architect.

C. Stainless Steel: ASTM A666, Type 304, soft temper, 28 gage (0.0156 inch) thick; smooth No. 4 finish.

D. Refer to drawings for locations of sheet metal types.

2.02 ACCESSORIES

A. Fasteners: Match metal type being fastened, with soft neoprene washers.
   1. Nails: Flathead, wire, barbed, slating type.
   2. Screws: Self-tapping sheet metal type.
   3. Rivets: Type and size as recommended by sheet metal manufacturer.
   4. Concrete Fasteners: Round-head stainless steel screw and neoprene washer with lead expansion anchor, FS FF-S-325, Group IV, Type 2. Power Rawl Screw Type Nailins.

B. Underlayment: Rubberized, self-adhering.

C. Primer: Zinc chromate type.

D. Protective Backing Paint: Zinc molybdate alkyd.

F. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

G. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.

H. Plastic Cement: ASTM D4586, Type I.

I. Solder: ASTM B32, Sn50 (50/50) type.

J. Rubberized Underlayment: Self-adhering, polyethylene coated rubberized asphalt, minimum 30 mil. Thick, Vycor Ultra by W. R. Grace and Co. or WIP 3600HT by Mirafi, for high temperature applications.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, minimum 3 inches wide, interlocking with sheet.

C. Make angle ends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

D. Form pieces in longest possible lengths.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

F. Form material with scheduled or specified seams. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

G. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.04 FABRICATED ITEMS

A. Flashings, Counterflashings and Misc: Galvanized sheet steel as scheduled, formed in minimum 10 ft lengths where possible, detailed as indicated.

B. Scuppers (Metal Edge): Galvanized sheet steel (ZincGrip PaintGrip), similar to SMACNA Figure 1-28, joints fully soldered.

C. Overflow Parapet Scuppers: Prefinished sheet steel face trim and 24 gage galvanized sheet steel throat (ZincGrip PaintGrip), SMACNA Figure 1-30A and 1-30B, joints of flashing flange and throat fully soldered.

D. Area Divider Curb Cover: 24 gage galvanized sheet steel, formed in 10 ft lengths, with lapped joints.

E. Continuous Cleats: Minimum 1-1/4-inch continuous strips, same material and thickness as adjacent sheet steel metal item, except where heavier gage is noted on detail drawings.

F. Expansion Joint Cover Assemblies: Gage and material as indicated on Drawings formed in 10-foot maximum length where possible. Fabricated as indicated, similar to SMACNA Figure 5-1, 5-3 (near roof edges) and 5-6B.

G. Conductor Head and Downspouts: Gage, profile and materials as indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

C. Verify that substrates are smooth and clean to extent needed for sheet metal work.

D. Do not start sheet metal work until conditions are satisfactory.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION - GENERAL

A. Conform to drawing details and requirements of SMACNA – Architectural Sheet Metal Manual.

B. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Conceal flashings to the extent possible, while maintaining specified drainage.

G. Solder metal joints in galvanized steel items for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

3.04 INSTALLATION – FABRICATED ITEMS

A. Flashings, Counter Flashings
   1. Extend flanges into reglets or receivers and securely fasten.
   2. Where nailing is required, nail at 6 inches o. c.
   3. Overlap counter flashing 4 inches over base flashing, lap ends of sheets 3 inches.

B. Scuppers: Install throat with joints fully soldered. Extend flanges 4 inches in each direction. Install sealant between flanges and wall surfaces.

C. Area Divider Curb Flashings:
   1. Install over membrane base flashing or rubberized underlayment.
   2. Secure flanges with neoprene washered screws through slotted holes at 24 inches o. c. similar to SMACNA Figure 3-1.
   3. Join sheets with lapped and soldered joints.
   4. Form corners with connections watertight, seamed, and soldered.

D. Expansion Joint Curb Cover and Flashings:
   1. Install 45 mil EPDM sling with sealed and overlapped joints and fibrous batt insulation as detailed.
   2. Install metal cover as detailed.
   3. Secure with fasteners and neoprene washers at 12 inches on center.
   4. Slope top to drain.
   5. Furnish pre-fabricated corners at all changes in plane or direction in accordance with SMANNA requirements.

E. Conductor Heads:
   1. Prefinished sheet steel, formed in minimum construction material is 24 gage galvanized steel.
   2. Conductor heads should be installed according to methods outlined in Figures 1-26, 1-27, and 1-*28 per MNACA requirements.
   3. Face Width: 3 to 4 times downspouts width.
   4. Face Depth: 2 times downspout width.
   5. Height: 3 to 4 times downspout width.

F. Downspouts: Prefinished sheet steel, upper sections telescoped into lower sections 1-1/2 inch, riveted and sealed.
   1. Fabricate downspouts with elbows discharging onto splash pans or splash blocks.

G. Fascia:
   1. Prefinished sheet steel, formed in minimum 10 ft lengths to profiles as detailed, similar to SMACNA Figures 8-9 and 8-10.
   2. Provide concealed back-up plate at joints.
   3. Provide mitered corners, sealed.

3.03 CLEANING

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean and free of stains, scrap, and debris.

END OF SECTION

SECTION 07 7100

ROOF SPECIALITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufactured copings.

1.2 RELATED REQUIREMENTS

A. Section 07 6000 - Sheet Metal Work.

B. Section 07 7200 - Roof Accessories.

1.3 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2005.

B. ANSI/SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems, American National Standards Institute/Single-ply Roofing Institute.

C. FM DS 1-49 - Perimeter Flashing; Factory Mutual Research Corporation.

D. (SMACNA) - Architectural Sheet Metal Manual, 7th Edition, 2012.

1.4 SUBMITTALS

A. Procedures for Submittals: Section 01 3300.

B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

D. Samples: Submit one appropriately sized sample of each coping profile. Submit verification sample of pre-finished metal color.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual details, FM DS 1-49 and ANSI/SPRI ES-1.

1.6 WARRANTY

A. Provide Owner a written warranty which shall warrant metal coping system to be free of leaks and defects in materials and workmanship for 5 years after date of Substantial Completion.

B. Provide finish warranty for 20 years against defects in finish including fading, chipping and chalking.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Copings:
   1. Viridian Systems; Product Permasnap Coping: www.wph.com.
   2. MM Systems Corp; Product Snap-Lock Coping: www.mmsystemscorp.com.
   3. Construction Specialties; Product Snap-Lock Coping.

2.2 COMPONENTS

A. Copings: Formed 24-gauge prefinished galvanized steel, custom shaped as indicated, including special supports spaced at 60 inches on center. Include cover plates to conceal and weather seal joints and attachment flanges. Copings tested to meet requirements of ANSI/SPRI ES-1
   1. Internal Splice Plates: Concealed with matching finish to maintain outside face continuity.
   2. Coping Finish: Fluoropolymer coating (High Performance).
   3. Color: To match existing.

B. Contractor's Option: Shop fabricated copings may be substituted for manufactured copings providing that independent testing of fabricated copings is performed in accordance with ANSI/SPRI ES-1, refer to Section 07 6000.

2.3 ACCESSORIES

A. Anchor Cleats: Formed anchor cleat with integral drainable gutter, 20 ga. galvanized steel.

B. Sealant: Type silicone sealant as specified in Section 07 5900.

2.4 FINISHES

A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color to match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that walls, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions and in accordance with SMACNA Architectural Sheet Metal Manual, FM DS 1-49 and ANSI/SPRI ES-1.

B. Install work watertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.

C. Securely fasten copings with concealed fasteners, anchors and cleats.
   1. Cleats: Secure with fasteners spaced at 12 inch centers maximum.
   2. Copings: Secure at exterior face to continuous cleat and at interior face with neoprene gasketed fasteners at 12 inch centers maximum through slotted holes.
   3. Double fasteners (decrease spacing by 1/2) at corners in accordance with ANSI/SPRI ES-.

D. Install copings plumb and level, and in true alignment.

END OF SECTION 07 71 00

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Molded pipe supports.

B. Prefabricated roof curbs.

D. Pipe penetration Housings.

1.2 RELATED SECTIONS

A. Section 07 5200 – Modified Bituminous Membrane Roofing.

B. Section 07 6000 - Sheet Metal Work.

C. Section 07 7100 - Manufactured Roof Specialties.

1.3 SUBMITTALS

A. Procedures for Submittals: Section 01 33 00.

B. Product Data: Provide manufacturer's product data sheets, including installation instructions.

C. Shop Drawings: Indicate following.
   1. Prefabricated Roof Curbs: Indicate inside and outside dimensions of curbs, height of curbs (at high side and at low side), weights of units being supported, gauge of metal selected to support scheduled load, location and size of fasteners and correlation to adjacent construction.

PART 2 - PRODUCTS

2.1 PIPE/DUCT SUPPORTS

A. Type 1:
   1. Qualities: Base 100% recycled rubber, UV resistant, 4” Height X 6” Width X 9.6” Length (Over all Height 8” or 12”). 14 gage galvanized steel Channel Strut designed to support conduit and condensate pipes above roof. Two ½” electro zinc plated all thread rod risers.
   2. Source: Mifab CE10-8.

B. Type 2:
   1. Base 100% recycled rubber, UV resistant, 6” Length of X 9.6”. Roller width – 3”, 4'' or 6” with total height of 6” or 7”.
   2. Source: Mifab CR10-4.

2.2 PREFABRICATED ROOF CURB

A. Qualities: Prefabricated insulated curb for mechanical equipment support fabricated from galvanized sheet steel, 18 ga. minimum, welded construction designed to support weight of unit being supported. Provide with preservative treated wood nailer.
   1. Fabricate curbs to compensate for roof slope at location of each curb unit.
   2. Fabricate curbs with minimum 24-inch height above roof deck, unless otherwise detailed.
   3. Fabricate curbs to width and length of unit being supported, less 1-1/2 in. overall to allow for membrane flashing installation.

B. Source:
   1. Model CRC-3 by Custom Curb, Inc.
   2. Model TC-3 by ThyCurb.

2.3 PIPE PENETRATION HOUSING:

A. Basis of Design Product: The Vault by Roof Penetration Housings.
   1. Acceptable Substitutions: Alta Products, Pipe Chase Housing and Curb.
   a) Curb must be of adequate height to provide required flashing height. Refer to details.

B. Construction:
   1. 0.080 inch thick aluminum housing and curb
   2. UV protected powder coated finish (2 mil thick)
   3. Stainless Steel. V.P. fasteners
   4. Gasketed lid to housing and housing to curb connection joints to ensure compliance to ICC 2015 Air Permeance Levels
   5. Standard Color: Beige
   6. Constructed to withstand wind to 225+ MPH, third party tested.

C. Style & Sizes:
   1. Series AW Vault – All Aluminum Construction, Wind rated to +225 mph and pre-insulated (R-2 for Condensate) V.P./S.S. Fasteners meets ICC 2015
      a) Mini-Tower Vault: Model: AW-121022, L- 12” W- 10” H-22”. Designed for electrical power switch/disconnects and small satellite dish mounts
      b) Small Vault: Model: AW-161010, L- 16 ½” W- 9 ¾” H- 10”. Designed to small AC Condensing Units up to 7 ½ tons. Accommodates up to 1.9 OD pipes/conduits. Designed for a power conduit, control conduit, liquid line and suction line.
      c) Medium Vault: Model: AW-201412, L- 20 ½” W- 14 ½” H – 12”. Accommodates multiple pipes/conduit/telecommunication cables to the roof. Designed for 4 condensing units (two on each side) up to 16 Series 5000 Exit Seals.
      d) Mega Vault: Model: AW-343424 L – 34” W – 34” H – 24”. Allows for a wide variety of installation choices, including multiple AC units, larger pipe diameters, large electrical disconnects and ducts up to 30+ Series 5000 Exit Seals.
   2) Series AWI – Same as AW Series w/Pre-Insulated curb, 6” Thick, R-40 Factor, to meet ICC – 2015 Energy Code.
      a) Small Vault: Model: AWI-161010, L – 16 ½” W – 9 ¾” H – 10”
      b) Medium Vault: Model: AWI-201412 L – 20 ½” W – 14 ½” H – 12”
      c) Mega Vault: Model: AWI-343424 L – 34” W – 34” H – 24”

2.4 ASSEMBLED ROOF PENETRATION HOUSINGS (For use in non-storm rated locations)

A. Housing: Roof Products, Inc.; Model RPPC-90, 90-degree pipe chase.
   1) Finish: Galvanized.

B. Exit Seal: Alta Products, LLC; Sigrist Exit Seal, Regular and X-Long as required.
   2) Size: As required for penetrating item.

2.5 RELATED MATERIALS

A. Concrete and Masonry Fasteners: Round-head stainless steel screw and neoprene washer with lead expansion anchor, FS FF-S-325, Group IV, Type 2, Powers Rawl Screw Type Nailins.

B. Nails: Stainless steel material, flathead, wire, barbed, slating, type. For washers use rubber.

C. Flashing Cement: ASTM D4586, Type I; asbestos free.

D. Asphaltic Coating Compound: FS TT-C-494A, Type II.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrates are smooth and clean to extent needed for roof accessories work.

B. Do not start work until conditions are satisfactory.

3.2 INSTALLATION

A. General:
   1. Install work watertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
   2. Coat contact surfaces of dissimilar metals with asphalt coating compound or zinc chromate paint.
   3. Install curbs and roof hatches in accordance with manufacturer's instructions.

B. Pipe/Duct Supports:
   1. Install Pipe Support - Type 1 under single small piping and conduit, other than gas piping.
   2. Install Pipe Support - Type 2 under gas piping and piping and conduit 2 to 4 inch in diameter.
   3. Install scheduled pipe supports at 8 ft. o.c. and within 2 ft. of each change of direction.
   4. Secure pipe and conduit loosely in pipe support using metal strap fastened with two 1/2 in. No. 10 screws and provide pipe sleeves to prevent contact with dissimilar metals.
   5. Install Duct Supports – Type 3 at ductwork at 4’-0” on center in linear direction and within 2’-0” of each in change of direction.

C. Prefabricated Roof Curbs:
   1. Install prefabricated roof curb where shown and install a flexible flashing separator between nailer and deck.
   2. Set level and square on roof deck to ensure equipment is level; securely fasten curb flanges to roof deck with appropriate fasteners for type of deck material. Seal bolt heads with flashing cement.

D. Pipe Penetration Housing and Assembled Penetration Housing:
   1. Install in accordance with manufacturer’s instructions.
   2. Curb & Unit installed by Roofing Contractor.
   3. Protect products until project is complete.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 CLEANING

A. Leave work clean and free of stains, scrap, and debris.

END OF SECTION 07 72 00

SECTION 07 8400

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping materials.

B. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED SECTIONS

A. Division 1 sections: Cutting and patching.

1.03 REFERENCES

A. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; current edition.

B. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

C. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

D. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Division 1 sections for submittal procedures.

B. Schedule of Firestopping: List each type of penetration and proposed product.

C. Product Data: Provide data on product characteristics.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Certificate from authority having jurisdiction indicating approval of materials used.

G. General Contractor to submit and retain on project a 3 ring binder with a schedule of all required firestopping products to be applied on the project to ensure fire ratings as shown on code sheets are preserved. Binder should be stamped by AHJ and sent to project Architect, Owner and Contractor for field reference purposes. It is the responsibility of the General Contractor to provide compatible products for each coordinated penetration and current building and inspector code required installations.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs which provide the specified fire ratings required by local applicable code when tested in accordance with methods indicated.
   1. Listing in the current classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
   2. Current evaluation reports published by CABO, ICBO, or BOCA will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. With minimum five years documented experience installing work of this type.

2. Approved by firestopping manufacturer.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING ASSEMBLIES

A. Firestopping: Use listed materials meeting requirements.
   1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E 814 that has F Rating equal to fire rating of penetrated assembly and T Rating Equal to F Rating and that meets all other specified requirements.

2.02 MATERIALS

A. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
   1. Manufacturers:
      a. A/D Fire Protection Systems Inc: www.adfire.com.
      b. 3M Fire Protection Products: www.mmm.com/US/arch_construct.
      c. Specified Technologies, Inc: www.stifirestop.com.
      d. See Division 1 sections for substitution procedures.

B. Foam Firestoppping: Single component foam compound.
   1. Manufacturers:
      a. 3M Fire Protection Products: www.mmm.com/US/arch_construct.
      b. Specified Technologies, Inc: www.stifirestop.com.
      c. See Division 1 sections for substitution procedures.

C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers.
   1. Manufacturers:
      a. A/D Fire Protection Systems Inc: www.adfire.com.
      b. USG Corporation: www.usg.com.
      c. See Division 1 sections for substitution procedures.

D. Fiber Packing Material: Mineral fiber packing insulation.
   1. Manufacturers:
      a. A/D Fire Protection Systems Inc: www.adfire.com.
      b. Pecora Corporation: www.pecora.com.
      c. USG Corporation: www.usg.com.
      d. See Division 1 sections for substitution procedures.

E. Firestop Devices: Mechanical device with silicone elastomer filler and sheet stainless steel jacket, collar, and flanged stops.
   1. Manufacturers:
      a. Grace Construction Products: www.na.graceconstruction.com.
      b. 3M Fire Protection Products: www.mmm.com/US/arch_construct.
      c. Specified Technologies, Inc: www.stifirestop.com.
      d. See Division 1 sections for substitution procedures.

F. Intumescent Putty: Compound which expands on exposure to surface heat gain.
   1. Manufacturers:
      a. Grace Construction Products: www.na.graceconstruction.com.
      b. 3M Fire Protection Products: www.mmm.com/US/arch_construct.

c. Specified Technologies, Inc: www.stifirestop.com.
d. See Division 1 sections for substitution procedures.

G. Firestop Pillows: Formed mineral fiber pillows.
1. Manufacturers:
a. Grace Construction Products: www.na.graceconstruction.com.
b. Nelson Firestop Products: www.nelsonfirestop.com.
c. Specified Technologies, Inc: www.stifirestop.com.
d. See Division 1 sections for substitution procedures.

H. Primers, Sleeves, Forms, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.

B. Remove incompatible materials which may affect bond.

C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authority having jurisdiction.

C. Install labeling required by code.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces of firestopping materials.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9005

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

C. Hollow gaskets.

1.02 REFERENCES

A. ASTM C 834 - Standard Specification for Latex Sealants; current edition.

B. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications; current edition.

C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; current edition.

D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; current edition.

E. ASTM D 1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; current edition.

F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.03 SUBMITTALS

A. See Division 1 sections for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

C. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years experience.

D. Joint sealer to be applied to all dissimilar materials whether indicated on drawings or not. Colors must be submitted and approved as a mock up prior to commencement of Work.

1.05 MOCK-UP

A. Provide mock-up of sealant joints in conjunction with exterior masonry mock-ups.

B. Construct mock-up with specified sealant types and with other components noted.

C. Locate where directed.

D. Mock-up may not remain as part of the Work.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 COORDINATION

A. Coordinate the work with all sections referencing this section.

B. Mock-ups must be complete for review and approval. Only after complete mock-up has been approved may Work commence.

1.08 WARRANTY

A. Correct defective work within a ten year period after Date of Substantial Completion.

B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

A. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
   1. Color: Standard colors matching finished surfaces.
   2. Applications: Use for:
      a. Control, expansion, and soft joints in masonry.
      b. Joints between concrete and other materials.
      c. Joints between metal frames and other materials.
      d. Other exterior joints for which no other sealant is indicated.

B. General Purpose Siliconce Building Sealant: ASTM C920, Grade NS, single component silicone type, nonstaining.
   1. Color : As selected by Architect to match existing work.

C. Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
   1. Color: Selected from standard range by Architect.
   2. Size as required to provide weathertight seal when installed.
   3. Applications: Use for:
      a. Exterior wall expansion joints.

D. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
   1. Applications: Use for:
      a. Concealed sealant bead in sheet metal work.
      b. Concealed sealant bead in siding overlaps.

E. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.
   1. Color: Standard colors matching finished surfaces as approved by Architect.
   2. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

F. Bathtub/Tile Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant. Color to be selected by Architect.
   1. Applications: Use for:
      a. Joints between plumbing fixtures and floor and wall surfaces.
      b. Joints between kitchen and bath countertops and wall surfaces.

G. Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
   1. Applications: Use for concealed locations only:
      a. Sealant bead between top stud runner and structure and between bottom stud track and floor, when indicated on drawings.

H. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A; single component.
   1. Approved by manufacturer for wide joints up to 1-1/2 inches.
   2. Color: Standard colors matching finished surfaces approved by Architect.

3. Applications: Use for:
   a. Expansion joints in floors.

I. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, I, M and A; single component.
   1. Color: Gray.
   2. Applications: Use for:
      a. Joints in sidewalks and vehicular paving.

2.02 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C 1193.

C. Perform acoustical sealant application work in accordance with ASTM C 919.

D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
   1. Width/depth ratio of 2:1.
   2. Neck dimension no greater than 1/3 of the joint width.
   3. Surface bond area on each side not less than 75 percent of joint width.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave.

I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

J. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

END OF SECTION

SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for floor, wall, and ceiling surfaces.

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories: Placement of joint cover assembly frames in formwork.

B. Section 04 2000 - Unit Masonry: Placement of joint cover assembly frames in masonry.

C. Section 04 2001 - Brick Veneer Masonry: Placement of cover assembly frames in brick veneer.

D. Section 07 5200 - Modified Bituminous Roofings: Coordination of expansion joints with roof membrane.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Roof expansion and control joint covers.

F. Section 07 9200 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.

G. Section 09 2116 - Gypsum Board Assemblies: Gypsum board control joint trim.

H. Section 09 5100 - Acoustical Ceilings: Expansion joint assemblies in suspended ceiling grids.

1.03 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.

1.04 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.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements 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. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Construction Specialties, Inc; www.c-sgroup.com/#sle.
   2. MM Systems Corp; www.mmsystemscorp.com/#sle.
   3. Pecora Corporation; www.pecora.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Interior Floor Joints Subject to Thermal Movement:
   1. Manufacturers:
      a. Balco, Inc; No-Bump Floor to Floor System, Aluminum (NBAF): www.balcousa.com/#sle.
      b. Construction Specialties, Inc; Allway Standard Metal Floor Covers: www.c-sgroup.com/#sle.
      c. Watson Bowman Acme Corporation; Wabo CorridorWrap Floor: www.watsonbowmanacme.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Interior Wall/Ceiling Joints Subject to Thermal Movement:
   1. Manufacturers:
      a. Balco, Inc; Wall and Ceiling Snap-On Joint Cover (WD): www.balcousa.com/#sle.
      b. Construction Specialties, Inc; Allway Standard Wall and Ceiling Covers: www.c-sgroup.com/#sle.

C. Exterior Roof Expansion Joint Covers:
   1. Manufacturers:
      a. Balco, Inc; Roof Metal Plate System, with Canted Curb (LPR): www.balcousa.com/#sle.
      b. SITURA Inc; RedLINE Waterproof Expansion Joint Systems: www.situra.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.03 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. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   4. 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.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221, 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
   1. Exposed Finish Outdoors: Natural anodized.
   2. Exposed Finish at Floors: Mill finish or natural anodized.
   3. Exposed Finish at Walls and Ceilings: Natural anodized.

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. For Vehicular Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
4. 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.

PART 3 EXECUTION

3.01 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.

3.02 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

END OF SECTION

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire rated and non-fire-rated steel doors and frames.

B. Steel frames for wood doors.

C. Thermally insulated steel doors.

D. Steel glazing frames.

E. Accessories, including glazing and louvers.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 – Door Hardware: Hardware for doors.

B. Section 08 8000 - Glazing: Glass for doors and glazed frames.

C. Section 09 9000 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; current edition.

B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; current edition.

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; current edition.

D. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; current edition.

E. ASTM E 1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; current edition.

F. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; current edition.

G. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; current edition.

H. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; current edition.

I. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

J. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; current edition.

1.04 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

B. Shop Drawings: Details of each opening, showing elevations, throat opening width, glazing, frame profiles, and identifying location of different finishes, if any.

C. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:
   1. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.
   2. Windsor Republic Doors: www.republicdoor.com.
   3. Steelcraft: www.steelcraft.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ANSI/ICC A117.1.
   2. Door Top Closures: Flush with top of faces and edges.
   3. Door Edge Profile: Beveled on both edges.
   4. Door Texture: Smooth faces.
   5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   7. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
   8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Exterior Doors:
   1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
   2. Core: Polystyrene foam.
   3. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.

B. Interior Doors, Non-Fire-Rated:
   1. Grade: ANSI A250.8 Level 1, physical performance Level C, Model 1, full flush.
   2. Thickness: 1-3/4 inches.

C. Interior Doors, Fire-Rated:
   1. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 1, full flush.

2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
    a. Provide units listed and labeled by UL.
    b. Attach fire rating label to each fire rated unit.
3. Core: Mineral fiberboard.

2.04 STEEL FRAMES

A. General:
1. Comply with the requirements of grade specified for corresponding door.
    a. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 1, 16 gage
2. Finish: Same as for door.
3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
5. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
6. Prior to ordering frames, field-confirm all wall throat openings.

B. Exterior Door Frames: Face welded, seamless with joints filled, 16 gage.
1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653, with manufacturer's standard coating thickness.
2. Weatherstripping: Separate, see Section 08 7100.

C. Interior Door Frames, Non-Fire-Rated: Fully welded type.
1. Terminated Stops: Provide at all interior doors; closed end stop terminated 6 inches above floor at 45 degree angle.

D. Interior Door Frames, Fire-Rated: Fully welded type.
1. Fire Rating: Same as door, labeled.

E. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 ACCESSORY MATERIALS

A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.
1. In Fire-Rated Doors: UL-listed fusible link louver, same rating as door.
2. Style: Standard straight slat blade.
3. Fasteners: Concealed fasteners.

B. Glazing: As specified in Section 08 8000, factory installed.

C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

D. Grout for Frames: Specified in Section 04 0513.

E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

F. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. In addition, install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Coordinate installation of hardware.

F. Coordinate installation of glazing.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Clearances Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Test sound control doors for force to close, latch, and unlatch in accordance with ASTM E 1408; adjust as required to comply.

END OF SECTION

SECTION 08 1416

FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire rated, non-rated.

1.02 REFERENCE STANDARDS

A. ASTM E413 - Classification for Rating Sound Insulation; current edition.

B. ASTM E1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; current edition.

C. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; current edition.

E. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; current edition.

G. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; current edition.

H. The Forest Stewardship Council; www.fscus.org

I. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; current edition.

J. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

K. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

L. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
   1. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards.
   2. Include certification program label.
   3. Provide manufacturer premium stains samples to architect.

C. Specimen warranty.

D. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.

E. Samples: Submit three samples of door construction, 12 x 12 inch in size cut from top corner of door.

F. Samples: Submit three samples of door veneer, 24 x 24 inch in size illustrating wood grain, stain color, and sheen.

G. Certifications: Provide wood products containing certification and label of the Forest Stewardship Council.

H. Manufacturer's Installation Instructions: Indicate special installation instructions.

I. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
   1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
   2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

C. Quality Certification: Provide AWI Quality Certification Program inspection report and quality certification of completed work.
   1. Provide labels or certificates indicating that the work complies with requirements of AWS Grade or Grades specified.
   2. Prior to delivery to the site provide shop drawings with certification labels.
   3. Provide labels on each product when required by certification program.
   4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
   5. Arrange and pay for inspections required for certification.
   6. Replace, repair, or rework all work for which certification is refused.

D. Installed Fire Rated Door: Conform to NFPA 80 for fire rated class as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. Interior Doors: Provide manufacturer's warranty for the life of the installation.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Eggers Industries: www.eggersindustries.com.
   2. Graham Wood Doors: www.grahamdoors.com
   3. Maiman Fine Architectural Doors: www.maiman.com
   4. Haley Brothers; www.haleybros.com
   5. Marshfield Door Systems; www.marshfielddoors.com
   6. Substitutions: See Section 01 6000 – Product Requirements.

2.02 DOORS AND PANELS

A. All Doors: See drawings for locations and additional requirements.
   1. Quality Level: Custom Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at all locations.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252, UL 10B, or UBC Standard 7-2-94 ("neutral pressure"); UL or WH (ITS) labeled without any visible seals when door is open.
   3. Smoke and Draft Control Doors: In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure at both ambient and elevated temperatures; with "S" label; if necessary, provide additional gasketing or edge sealing.
   4. Smoke and Draft Control Doors: In addition to required fire rating, provide door assemblies tested in accordance with UBC Standard 7-2, Part II; provide additional gasketing or edge sealing.
   5. Wood veneer facing with factory applied transparent finish.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type – Structural Composite Lumber, plies and faces as indicated above.

B. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

C. Sound Retardant Doors: Equivalent to Type PC construction with core as required to achieve rating specified; plies and faces as indicated above.

D. All doors to contain minimum 85% recycled content.

2.04 DOOR FACINGS

A. Wood Veneer Facing for Transparent Finish: Match species and cut of existing doors. Veneer grade as specified by quality standard.
   1. Vertical Edges: Same species as face veneer.
   2. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.

2.05 ACCESSORIES

A. Glazing Stops: Aluminum channel shape, mitered corners; prepared for countersink style tamper proof screws.

B. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

C. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

D. Fill, sand and match finish of all nail holes.

E. **Vision Panel**: Trudoor Air Louvers VSIGMB Vision Lite Kit with Intergral Mini Blinds in insulated glass. Frame color from manufacturer standard frame finish. Blind custom color as noted by architect. Frame VLFEZIG Profile.

2.06 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other through-bolted hardware.
   3. Top and Bottom Rails to be minimum 2-3/8 inches.
   4. Side Rails to be minimum 2-1/2 inches.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with

hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:
   1. Transparent:
      a. System - 3, Lacquer, Postcatalyzed.
      b. Stain: To match existing.
      c. Sheen: Satin.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not factory cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall access door and frame units.

1.02 REFERENCE STANDARDS

A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, 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 all access door units.

D. Manufacturer's Installation Instructions: Indicate installation requirements.

E. Project Record Documents: Record actual locations of all access units.

PART 2 PRODUCTS

2.01 ACCESS DOOR AND PANEL APPLICATIONS

A. Walls, Unless Otherwise Indicated:
   1. Material: Stainless steel, Type 304.
   2. Size: 12 x 12 inches, unless otherwise indicated.
   3. Tool-operated spring or cam lock; no handle.
   4. In All Wall Types: Surface mounted face frame and door surface flush with frame surface.
   5. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.
   6. In Plaster: Drywall bead frame with door surface flush with wall surface.
   7. In Masonry: Surface mounted frame with door surface flush with frame surface.

B. Walls in Wet Areas:
   1. Material: Stainless steel, Type 304.
   2. Size: 12 x 12 inches, (24 x 24 in group restrooms) unless otherwise indicated.
   3. Tool-operated spring or cam lock; no handle.
   4. In All Wall Types: S urface mounted face frame and door surface flush with frame surface.
   5. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.
   6. In Plaster: Drywall bead frame with door surface flush with wall surface.
   7. In Masonry: Surface mounted frame with door surface flush with frame surface.
   8 In Tile: Recessed cover to accept matching ceramic tile.

C. Fire Rated Walls: See drawings for wall fire ratings.
   1. Material: Stainless steel, Type 304.
   2. Size: 12 x 12 inches, unless otherwise indicated.
   3. Insulated, double skin door panel.
   4. Tool-operated spring or cam lock; no handle.

C. Floor Access Doors:
   1. Bilco KD 2, with safety posts.

2.02 WALL UNITS

A. Manufacturers:
   1. Acudor Products Inc: www.acudor.com.
   2. Cendrex, Inc: www.cendrex.com.

3. Karp Associates, Inc: www.karpinc.com.
4. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.

B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
1. Style: Exposed frame with door surface flush with frame surface.
   a. In Gypsum Board: Use drywall bead type frame.
   b. In Plaster: Use plaster bead type frame.
2. Door Style: Single thickness with rolled or turned in edges.
3. Frames: 16 gage, 0.0598 inch, minimum.
4. Double-Skinned Hollow Steel Door Panels: 16 gage, 0.059 inch, minimum, on both sides and all edges.
5. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly in which they are to be installed.
   a. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.
6. Stainless Steel Finish: No. 4 brushed finish.
7. Hardware:
   a. Hardware for Fire Rated Units: As required for listing.
   b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
   c. Latch/Lock: Tamperproof tool-operated cam latch.
   d. Gasketing: Extruded neoprene, around the perimeter of the door panel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings. Secure rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08 3490

TORNADO-RESISTANT ASSEMBLIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:

1. Hollow metal Tornado Doors
2. Hollow metal Doors with Glass Lights
3. Hollow metal Tornado Frames
4. Hollow metal Tornado Shutters

B. Exclusions: Metal for the following is not provided under the scope of this section:

1. Structural steel
2. Headers and lintels
3. Framing
4. Steel channel frames
5. Access panels
6. Door hardware

C. Related Sections:

1. Division 01 Section “Alternates” for alternates affecting the work of this section.
2. Division 03 Section “Precast Structural Concrete”
3. Division 04 Section “Unit Masonry”
4. Division 07 Section “Joint Sealants”
5. Division 08 Section “Steel Doors and Frames”
6. Division 08 Section “Door Hardware”
7. Division 08 Section “Glass and Glazing”
8. Division 09 Sections for touchup finishing or refinishing of existing openings modified by the work of this section.
9. Division 26 Sections for connections to electrical power system and for low-voltage wiring work.
10. Division 28 Sections for coordination with other components of other components of electronic access control system.

1.03 REFERENCES

A. Tornado Resistant Assemblies

1. IBC – International Building Code

    a. 2021 Edition, Section 423 – Building types or functions and geographic locations to be built with a storm shelter.

2. ICC/NSSA - International Code Council / National Storm Shelter Association

    a. ICC 500-2020 Standard for the Design and Construction of Storm Shelters

3. FEMA – Federal Emergency Management Agency

    a. FEMA P-361, Fourth Edition / April 2021 – Safe Rooms for Tornados and Hurricanes: Guidance for Community and Residential Safe Rooms
    b. FEMA P-320, Fifth Edition / March 2021 – Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business

B. Fire/Life Safety

1. NFPA - National Fire Protection Association

    a. NFPA 70 – National Electric Code
    b. NFPA 80 - Standard for Fire Doors and Fire Windows
    c. NFPA 101 - Life Safety Code
    d. NFPA 105 - Smoke and Draft Control Door Assemblies

2. State Fire Safety Code.

C. UL - Underwriters Laboratories

1. UL 10C - Positive Pressure Test of Fire Door Assemblies
2. UL 1784 - Air Leakage Tests of Door Assemblies

D. Accessibility

1. ADA - Americans with Disabilities Act.
2. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

E. SDI – Steel Door Institute

1. SDI 100/ANSI A250.8 - Recommended Specifications - Standard Steel Doors and Frames.

    a. SDI Certified https://www.steeldoor.org/sdicertified.php

2. SDI 105 - Recommended Erection Instructions for Steel frames.
3. SDI 111 - Recommended Details and Guidelines for Standard Steel Doors and Frames and Accessories.
4. SDI 112 - Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.
5. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
6. SDI 118 - Basic Fire Door Requirements.
7. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
8. SDI 124 - Maintenance of Standard Steel Doors and Frames.

F. ANSI - American National Standards Institute (refers to most current versions of standards)

1. ANSI/DHI A115.IG - Installation Guide for Doors and Hardware.

2. ANSI/BHMA A156.1 - A156.29, and ANSI A156.31 - Standards for Hardware and Specialties
3. ANSI A250.3 - Test Procedure and Acceptance Criteria for - Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
4. ANSI A250.4 - Test Procedure and Acceptance Criteria for - Physical Endurance for Steel Doors, Frames, Frame Anchors, and Hardware Reinforcings. Product is tested and provided as Level “A”, 1,000,000 cycle test criteria and other requirements as listed in these specifications.
5. ANSI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
6. ANSI/SDI A250.8/SDI-100 Recommended Specifications for Standard Steel Doors and Frames.
7. ANSI A250.10 - Test Procedures and Acceptance Criteria for – Prime Painted Steel Surfaces for Steel Doors and Frames.
8. ANSI A250.11 - Recommended Erection Instructions for Steel Frames.

G. NAAMM - National Association of Architectural Metal Manufacturers

1. NAAMM/HMMA-840 - Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.

1.04 SUBMITTALS

A. General:

1. Submit the following in accordance with conditions of contract and Division 01 requirements.
2. Advise Architect within the submittal package of incompatibility or issues which may detrimentally affect the work of this section.
3. Prior to forwarding submittal: Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

B. Action Submittals:

1. Product Data: Provide illustrations from manufacturer’s catalogs and data in brochure form for all products, including model, function, reinforcements, anchoring, design, finish, and options.
2. Door and Hardware Schedule: Organize schedule into spreadsheet format indicating complete designations of every item required for each door and frame. Door and hardware schedule shall clearly indicate architect's door number, elevations, and notes.
3. Shop Drawings: Drawings of openings aligning with the Door, frame, and hardware schedule in accordance with SDI 111D. Show types, quantities, dimensions, materials and similar data for each opening required.

    a. Indicate frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, to ensure doors and frames are properly prepared and coordinated to receive specified hardware.
    b. Indicate all door elevations, internal reinforcements and closure methods.
    c. Indicate all hardware and accessories.

4. Templates: After final approval of the door and hardware schedule, provide listing of manufacturer's hardware locations for each item of hardware.

C. Informational Submittals:

1. Qualification Data: For manufacturer, supplier, installer and Certified Door Consultant.

    a. Supplier: A direct account of the manufacturer who has on permanent staff, an Architectural Hardware Consultant (AHC), a Certified Door Consultant (CDC) or an Architectural Openings Consultant (AOC), who will be available to consult with the Architect and Contractor regarding matters affecting the door and frame openings.

2. Product Certificates of Compliance or Public online listings from an accredited agency (Intertek or UL) shall be made available for compliance requirements, based on evaluation of comprehensive tests performed by the manufacturer and witnessed by a qualified, accredited testing agency for door and frame system assemblies.

    a. Evidence of manufacturer as “SDI Certified” from the Steel Door Institute.
    b. Manufacturer evidence of compliance with standards shown in 1.03 “References” section of this document.
    c. Listing Report number from an accredited testing and labeling facility (Intertek or UL) for the AHJ’s reference to the tornado approval. Listing Report shall communicate design pressure and missile impact tests in accordance with ICC 500-2020 requirements.
    d. Signed/Sealed Report with calculations of anchoring requirements including locations and minimum required capacity from a licensed third-party PE based on accepted engineering practice shall be made available upon request.
    e. Certificate or signed letter stating 5 years minimum experience installing labeled tornado products.
    f. Certificates of compliance or Public online listings from accredited testing and labeling facility sites (Intertek or UL) and installation instructions shall be made available upon request of Architect or authority having jurisdiction.

3. Warranty: As specified in this section pertaining to manufacturer, supplier and installer.

D. LEED Submittal

1. Where this project is to be registered with the US Green Buildings Council and certified under the LEED 2009 Green Buildings Program, the following shall apply;
2. Credit MR 4 - Recycle Content: Provide manufacturer’s certification as a percentage by weight for pre-consumer and post-consumer recycled material for all doors and frames on the project. The recycled percentage of the product shall be calculated against the final cost of the product to determine the recycled content dollar value.

E. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include the following:

    a. Complete information on care, maintenance, and adjustment; data on repair and replacement.
    b. Catalog pages for each product.
    c. Name, address, and phone number of local representative for each manufacturer.
    d. Copy of final approved door and frame schedule, edited to reflect conditions as-installed.
    e. Copy of warranties including appropriate reference numbers for manufacturers to identify the project.

1.05 QUALITY ASSURANCE

A. Product Substitutions: For the purpose of performing the work of this section, comply with product requirements stated in Division 01 and as specified herein.

1. Where a specific manufacturer's product is named and accompanied by the words "No Substitute," including make or model number or other designation, provide the product exactly as specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)

a. Where no additional products or manufacturers are listed in a product category, requirements for "No Substitute" govern product selection.

2. Where products indicate "acceptable substitute" or "acceptable manufacturer", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.
3. Substitutions: Refer to Division 01 for additional information regarding substitutions and submittals.

B. Supplier Qualifications and Responsibilities: A direct account of the manufacturer. A recognized hollow metal door and frame supplier of tornado-resistant approved systems, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying hollow metal doors and frames similar in quantity, type, and quality to that indicated for this project.

1. Engineering Responsibility: Preparation of data for field spliced or field modified units, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this project.
2. Coordination Responsibility: Coordinate preparation of the door hardware and provide installation and technical data to the Architect and other related subcontractors.

a. Upon completion of hollow metal door and frame installation, inspect and verify that all components are working properly.

C. Manufacturer: Member of Steel Door Institute and is SDI Certified, with specialized capabilities manufacturing tornado-resistant opening systems complying with ICC 500-2020 and FEMA 361 guidance, and provides labeled doors and frames from a qualified, accredited testing agency, including hardware and accessories specified in this section with minimum five years documented experience manufacturing tornado labeled systems.

1. Manufacturer Installation Instructions: Contractor shall maintain a current copy of tornado shelter storm door, frame and hardware manufacturer published installation instructions and ICC 500-2020 requirements in Project Field Office and refer to installation instructions at all times during installation.
2. Tornado-Resistant Openings Systems: Provide complete door systems for tornado-resistant storm shelters and other areas of refuge complying and tested according to FEMA 361, Fourth Edition / April 2021, Design and Construction Guidance for Community Safe Rooms; and ICC 500 (2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.
3. Label tornado-resistant doors and frames with affixed adhesive backed metal labels (non-Mylar, non-riveted) to clearly denote compliance with ICC 500-2020.

a. Each door and frame will have its own label showing what criteria the door and frame was tested in accordance with. The label will show what independent laboratory tested this assembly. The label will show design pressures both positive and negative in pounds per square foot, and impact missile weight and speed.
b. Doors with glass shall be etched or similarly labeled.

D. Installer Qualifications: Qualified tradesmen, skilled in the application of tornado hollow metal doors and frames that has a record of successful in-service performance for installing hollow metal doors and frames similar in quantity, type, and quality to that indicated for this project.

E. Single Source Responsibility: Obtain each type of hollow metal door and frame from a single manufacturer.

F. Fire-Rated Openings: Provide doors and frames for fire-rated openings that complies with NFPA Standard No. 80, UL10C, Category “A”, Positive Pressure Test of Fire Door Assemblies, and requirements of authorities having jurisdiction. Provide only doors and frames that are labeled and listed for ratings indicated by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to the authority having jurisdiction.

   1. Affix a physical label or approved marking to each fire door or fire door frame, at an authorized facility as evidence of compliance with procedures of the labeling agency. Label embossment is not permitted.
   2. Conform to applicable codes for fire ratings. It is the intent of this specification that hardware and its application comply or exceed the standards for labeled openings. In case of conflict between types required for fire protection, furnish type required by NFPA and UL.
   3. Fire door assemblies in exit enclosures and exit passageways; maximum transmitted temperature end point rating of not more than 250 degrees F (121 degrees C) above ambient at the end of 30 minutes of the standard fire test exposure.

G. Refer to Division 01 Section “Special Conditions” for additional information and minimum experience requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Tag each item or package separately with identification related to the final door and frame schedule, and include installation instructions with each delivery.

B. Comply with manufacturer’s current written instructions and recommendations.

C. Deliver doors in manufacturer’s standard labeled protective packaging.

D. Accept products on site in manufacturer’s packaging. Inspect for damage. Return damaged Products and replace with undamaged products.

E. Project field superintendent shall inspect products immediately upon delivery to project site, determine Product conformance with specified requirements and reject Products not complying with specifications. Project field superintendent shall direct that non-complying products be removed from project site immediately.

F. Handle, store and protect products in accordance with the manufacturers printed instructions and ANSI/SDI A250.10 and NAAMM/HMMA 840.

G. Project Conditions:

   1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

H. Protection and Damage:

1. Promptly replace products damaged during shipping with exactly the same products.
2. Handle doors and frames in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during the course of the Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

I. Refer to Division 01 Sections “Summary of Work” and “Special Conditions” for additional information and requirements regarding stored materials.

1.07 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. See Division 03 for concrete, reinforcement, and formwork requirements, and Division 04 2000 “Unit Masonry”.

B. Coordinate work with frame opening construction, door and hardware installation. Coordinate work with Section 08 11 00 Steel Doors and Frames, Section 08 71 00 Finish Hardware, and other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.

C. Verify field dimensions for factory assembled frames prior to fabrication.

D. Installation: Sequence installation to accommodate required door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing doors and frames to comply with indicated requirements.

E. Electrical System Roughing-In: Coordinate layout and installation of doors and frames with electrified door hardware connections.

1.08 WARRANTY

A. Provide manufacturer's warranties as specified in Division 01 and as follows:

1. Hollow Metal Doors and Frames: 1 year.
2. Warranty does not cover damage or faulty operation due to improper installation, improper use, or abuse.

1.09 MAINTENANCE

A. Maintenance Instructions: Furnish maintenance instructions as needed for Owner's continued maintenance of doors and frames.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

B. Acceptable Manufacturer: Allegion System assemblies including Steelcraft, Paladin Series PW doors and FP frames, latching hardware from Von Duprin Exit devices, Schlage LM9300 Multipoint locks and Ives surface bolts, and approved Allegion hardware accessories

2.02 EXISTING MATERIALS

A. Where existing doors and/or frames are indicated to be removed and reinstalled:

1. Carefully remove doors, frames, and/or components.
2. Clean, protect and store existing doors and/or frames in accordance with storage and handling requirements specified herein.
3. Reinstall in accordance with installation requirements for new doors and/or frames.

B. Existing openings must follow the same FEMA 361 guidelines and ICC 500-2020 standards as described in this tornado specification. The contractor is responsible for compliance of the wall system to be sure that the opening will accept approved Intertek or UL labeled tornado doors and frames. Signed/Sealed Third party certified PE drawings, calculations and/or site-specific inspections may be required by the Authority Having Jurisdiction (AHJ) to ensure proper wall and floor construction and anchoring for the tornado system labeled approval.

C. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 and UL 10C as required to maintain fire-rating.

2.03 MATERIALS

A. Fasteners

1. Provide fastenings, anchors and clips as required to secure hollow metal work in place. Provide manufacturers standard screws. Dimple metal work to receive screw heads. Set stops and other non-structural fastenings with manufacturer’s standard self-tapping screws.

B. Modification and Preparation of Existing Doors and/or Frames: Provide necessary fillers, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.

1. When possible, use materials which match materials of adjacent modified areas.
2. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

2.04 STEEL FRAMES – PALADIN FP14 SERIES FRAMES

A. Manufacturer:

1. Scheduled Manufacturer: Steelcraft.
2. Acceptable Substitute:

B. Provide 14 Gauge A60 galvannealed steel.

C. Provide tornado-resistant hollow metal frames as scheduled, and drawn and detailed on plans, with the provisions below.

D. Provided die-mitered corner connections to ensure tight/closed miters at head and jambs.

E. Factory prep: Welded

F. Factory prep: KD, frames welded by distributor.

G. Provide patented universal hinge preparations.

H. Provide beveled hinge and strike edges.

I. Provide 7 gauge hinge reinforcement. Where continuous hinges are provided in 08 71 00, provide 14 gauge full length reinforcement for continuous hinges.

J. Provide 12 gauge steel center strike reinforcement with 14 gauge head/sill strike reinforcement. Provide adjustable base anchors to allow for adjustment in installation when the floor is not level.

K. Provide factory applied baked-on rust-inhibiting primer.

L. Frames shall be installed with or without out grout fill. When using 4” face, provide frames grouted full utilizing proper grout fill protocols per SDI/ANSI 250.8. Grouting procedures shall follow hollow metal installation instructions and common practice.

M. Provide 14 gauge steel closer reinforcements when specified.

N. Opening sizes: Shall not exceed the smallest and largest sizes tested and approved per ICC 500-2020. Available sizes shall be publicly available on Intertek or UL listing websites.

O. Fire Rating: Where called for by the door and hardware schedules, tornado-resistant doors, frames, shutter, and glass lights shall be identified by an official metal label or etching (for glass) to signify tested approval from ITS – Warnock Hersey or Underwriters' Laboratories, to UL 10C protocols.

2.05 STEEL FRAMES – PALADIN FP14 SHUTTER SYSTEMS

A. Provide hollow metal frames as scheduled, and drawn and detailed on plans, with the provisions below.

B. Glass: Non-impact resistant glass (provided by others) can be installed in exterior (storm side) rabbet of frame.

C. Instructions for the installation or deployment of shutters shall be made available from the manufacturer.

2.06 STEEL FRAMES – ANCHORING

A. Provide hollow metal frames as scheduled, and drawn and detailed on plans, with the provisions below.

B. Approved frame anchors and any necessary anchor bolts certified by third party PE reports shall be provided from the factory for concrete walls (tilt-up/pre-fab/poured in place) or concrete-filled CMU block walls.

C. Provide installation instructions.

D. Provide anchoring approved by UL or Intertek Testing Services / Warnock Hershey (ITS/WHI), supported by testing and third-party PE reports. Approved anchoring shall provide a structural connection from the approved shelter foundation to shelter walls.

E. Grout new masonry frames full.

F. Provide frames to be used in existing masonry with tube and strap anchors welded from the factory.

2.07 STEEL DOORS – PALADIN PW14 SERIES DOORS

A. Provide tornado-resistant hollow metal doors as scheduled, and drawn and detailed on plans, with the provisions below.

B. Provide standard 14 gauge, A-60 galvannealed steel face skins for resistance against corrosion.

C. Steel stiffened core construction: Provide stiffeners welded or bonded to both face sheets.

D. Seamless, full height, mechanical interlock edges: Provide lock and hinge edges intermittently welded and filled smooth for structural support and stability the full height of the door

E. Provide full height lock side continuous minimum 12 gage steel reinforcement channels at lock rails.

F. Provide 12 gauge top channel and 14 gauge bottom channel steel reinforcement.

G. Provide doors with beveled hinge and lock edges.

H. Provide universal hinge preparations.

I. Provide 7 gauge hinge reinforcements.

J. Provide 14 gauge closer reinforcements.

K. Provide factory applied baked-on rust-inhibiting primer in accordance with ANSI A250-10, with finish paint options available.

L. Provide 1-3/4 inch thick doors.

M. Opening sizes shall not exceed the smallest and largest sizes tested and approved per ICC 500-2020. Available sizes shall be publicly available on Intertek or UL listing websites.

N. Provide handed doors and frames.

O. Provide doors beveled both hinge and lock sides.

P. Custom door undercuts shall be made available, provided they meet with the labelling agencies requirements.

Q. Follow installation instructions provided by the manufacturer. The hardware manufacturer’s strike must be used. Anchor or grout bottom strikes into the foundation slab.

2.08 TORNADO GLASS LIGHTS, LABELED AND NON-LABELED GLAZING

A. Provide approved tornado trim and glazing pre-installed from the factory.

B. Provide installation and care instructions to maintain tornado ratings.

C. Provide glass with an etching to signify compliance from ITS – Warnock Hersey or Underwriters' Laboratories. Embossed labels are not acceptable.

D. For fire rated assemblies with glass, a UL classified fire rated sealant must be used.

2.09 FINISHES

A. Chemical Treatment: Treat steel surfaces to promote proper paint adhesion per ANSI/SDI A250.3, Test Procedure and Acceptance Criteria for Factory Applied Finished Painted Steel Surfaces for Steel Doors and Frames.

B. Factory Prime Finish: Meet requirements of ANSI A 250.10., Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

2.10 TORNADO-RESISTANT DOOR HARDWARE AND ACCESSORIES

A. Provide approved hardware and accessories under Section 08 71 00 as part of the complete prescriptive door system approved by the Intertek or UL public listing for the labeled tornado-resistant assembly, communicating compliance with FEMA 361 guidelines and ICC 500-2020 standards.

B. Per ICC 500-2020 Section 507 requirements, operating hardware on the non-egress side shall be locked, disabled, or inactive and shall not be susceptible to unintentional unlatching by debris impact. If unlocked, non-egress hardware must be lockable from the protected side of the door with clear indicators and/or signage to instruct occupants to lock and clearly post how to lock down in an approaching storm event.

2.11 FABRICATION

A. Fabricate doors and frames in accordance with requirements of ANSI A250.8-2003/SDI 100.

B. Fabricate fire rated doors and frames in accordance with requirements of ITS – Warnock Hersey or Underwriters' Laboratories, with metal label on each door and frame signifying UL-10C compliance.

C. Typical Frame Reinforcing: Provide steel reinforcement as required for hardware items per manufacturers templates. Provide reinforcing per ANSI-A250.6.

D. Mortar Guards in Frames: For hinge and strike plate cutouts, provide fully enclosed pressed steel cover boxes spot welded to frames behind mortises. Additionally, for frames in masonry walls and frames being grout filled, provide metal mortar guards for any mortised cutouts.

E. Hardware Preparation at Frames: Mortise, reinforce, drill and tap as required for all mortised hardware furnished under Division 8 Finish Hardware and/or Division 26 Security in accordance with a final approved hardware schedule and templates provided by the hardware supplier and/or security supplier (including electric hinges and/or power transfers,

door position switches, and other electrified hardware). Drilling and tapping for surface door closers, door closer brackets, and adjusters shall be done in field by hardware installer. Obtain templates from hardware and security suppliers. Provide hardware preparation per ANSI-A250.6.

F. Joining at Frames:

1. **Knock Down (KD) Frames:** At interior and exterior three-sided door frames and 4-sided shutter frames, in masonry type walls, use knock down (KD) masonry type to be installed while wall is being constructed.
2. **Welded Frames:** At welded frames with equal width jambs and head, neatly miter on face and cope and butt stops. At other welded frames, provide same mitered joint wherever possible (at intersection of jamb-head or jamb-sill) and at other locations butt metal neat Face weld, or full profile weld as specified. Fabricate so no grind marks, hollow or other out-of-plane areas are visible. At joints of intermediate members (such as mullions), provide tight joining, neatly accomplished without holes, burned out spots, weld build up or other defacing work. Fill to close cracks and to preserve shapes. Tightly fit loose stops, to hairline joints. Joints shall be finished and primed.

G. Typical Door Reinforcement: Provide galvannealed steel reinforcement as required for hardware items per manufacturers' templates. Provide reinforcing per ANSI-A250.6.

H. Hardware Preparation at Doors: Mortise, reinforce, drill and tap as required for all mortised hardware furnished under Division 08 Finish Hardware and/or Division 28 Access Control in accordance with a final approved hardware schedule and templates provided by the hardware supplier and/or security supplier (including a minimum 1/2 inch raceway for electrical hardware, electric hinges and/or power transfers, door position switches, and other electrified hardware). Obtain templates from hardware and security suppliers. Provide hardware preparation per ANSI-A250.6.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of any doors and frames, examine supporting structure and conditions under which hollow metal doors and frames are to be installed. Correct all defects prior to proceeding with installation.

B. Correct unacceptable conditions are or defer to the architect or responsible building contractor to fix unacceptable conditions prior to hollow metal installation or at any point where unacceptable conditions are discovered.

3.02 PREPARATION

A. Where on-site modification of doors and frames is required, prepare hardware locations in accordance with the following:

1. Tornado assemblies shall not be unduly modified. Consult with the manufacturer or the Authority Having Jurisdiction as needed to maintain the labeled approval of the tornado door system, complying with ICC 500-2020.
2. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3. Where doors are in rated assemblies, comply with NFPA 80 for restrictions on on-site door hardware preparation.
4. Where on-site modification of existing doors and frames is required:

    a. Remove existing hardware being replaced, tag, and store according to contract documents.
    b. Field modify and prepare existing door and/or frame for new hardware being installed.
    c. When modifications are exposed to view, use concealed fasteners, when possible.

3.03 INSTALLATION

A. Install hollow metal in accordance with reviewed shop drawings and manufacturer's printed installation and anchoring instructions supporting ICC 500-2020 tornado approvals. Securely fasten and anchor work in place without twists, warps, bulges or other unsatisfactory or defacing workmanship. Set hollow metal plumb, level, square to proper elevations, true to line and eye. Set clips and other anchors with Ramset "shot" anchors or drill in anchors as approved. Units and trim shall be fastened tightly together, with neat, uniform and tight joints.

B. Placing Frames: Remove manufacturer’s shipping spreader-bars by grinding to avoid possible damage from hammering prior to installation. These shall not be used for setting of proper frame tolerances. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set in accordance with ANSI A250.11. After wall construction is complete, remove temporary braces and/or installation spreaders leaving surfaces smooth and undamaged. In masonry construction, building-in of anchors and grouting of frames with mortar is specified in Division 04 Section - Unit Masonry. At in-place concrete or masonry construction, set frames and secure in place using countersunk bolts and expansion shields, with bolt heads neatly filled with metallic putty, ground smooth and primed.

C. Place fire-rated frames in accordance with NFPA 80, and/or manufacturer’s follow-up procedure requirements.

D. Consult Hollow Metal technical data, installation instructions and anchoring instructions. The hardware manufacturer’s installation instructions must be followed to maintain tornado-resistant assembly approval.

E. Where continuous hinges are specified, provide full height 3/8 inch (9.5 mm) to 1-1/2 inch (38 mm) thick strip of polystyrene foam blocking at frames requiring grouting. Apply the strip to the back of the frame, where the hinge is to be installed, to facilitate field drilling or tapping.

F. Doors with internal concealed rods and associated latches shall be installed at the factory by the door manufacturer prior to shipment to the job site. Base installation upon FEMA lock manufacturer’s template and install instructions. Field installation, or supplier shop installation, of FEMA concealed internal rods and rod latches is only accepted with written approval from the hollow metal manufacturer.

G. Door Installation: Fit hollow metal doors accurately in their respective frames, within following clearances: Jambs and meeting edges of pairs of beveled edge doors 3/32-1/8 inch, heads 1/8 inch, sill where no threshold or carpet 1/4 inch above finished floor, sill at threshold 3/4 inch maximum above finished floor, sill at carpet 1/4 inch above carpet. Proper gaps between door edge and strikes shall follow manufacturer’s installation instructions. Place fire-rated doors with clearances as specified in NFPA 80.

H. Apply hardware in accordance with hardware manufacturers' instructions and Section 08 71 00 of these specifications. Install hardware with only factory-provided fasteners. Install silencers. Adjust door installation to provide uniform clearance at head and jambs, to achieve maximum operational effectiveness and appearance.

I. Drill and tap for surface door closers, door closer brackets, and other surface applied hardware.

3.04 FIELD QUALITY CONTROL

A. After installation of frames has been completed, a qualified person from the hardware installation company is to check the project to confirm the proper installation of frames to allow for the proper installation of doors and finish hardware scheduled.

B. Installer shall deliver to owner, upon completion, one set of installation and maintenance instructions for doors and frames.

C. Regular field inspection and adjustment is accepted and recommended to ensure proper latching throughout the life of the product.

3.05 ADJUSTING

A. Final Adjustments: Adjust doors and hardware prior to final inspection and acceptance by the Architect and Owner. Replace defective items including doors or frames that are damaged or unacceptable to the Architect and Owner. Regular field inspection and adjustment is accepted and recommended to ensure proper latching throughout the life of the product.

1. Adjust doors for proper operation, free from binding or other defects.
2. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.
3. Prime Coat / Touch up immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible, approved air-drying primer

B. Fire Door Assembly Inspection and Testing: Upon completion of the installation, provide functional testing and inspection of each fire door assembly on the project to confirm proper operation and that it meets all criteria of a fire door assembly as per NFPA 80. Inspections shall be performed by a Fire Door Assembly Inspector (FDAI) or a credentialed Architectural Hardware Consultant (AHC). A written report using reporting forms provided by the Door and Hardware Institute shall be maintained and transmitted to the Owner and made available to the authority having jurisdiction (AHJ). The report shall list each fire door throughout the project, and include each door number, location, hardware set used and summary of deficiencies.

1. Schedule fire door assembly inspection within 90 days of substantial completion of the project.
2. Correct all deficiencies and schedule a re-inspection of fire door assemblies which were noted as deficient on the inspection report.
3. Inspector shall re-inspect fire door assemblies after repairs are made.
4. Additional re-inspections which are required due to incomplete repairs will be performed by the inspector at the expense of the Contractor.

C. Prime Coat Touch-Up: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

3.06 PROTECTION

A. Provide for the proper protection of doors and frames until the Owner accepts the project as complete. Damaged or disfigured doors and frames shall be replaced or repaired by the responsible party. Some repairs may not be allowed in the field in order to maintain the labeled tornado approval. Consult with the manufacturer or the Authority Having Jurisdiction.

B. Advise General Contractor on measures necessary to protect installed products and finished surfaces from damage during construction.

END OF SECTION

SECTION 08 4113

ALUMINUM-FRAMED STOREFRONT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Aluminum storefront walls, perimeter trim, stools, accessories, shims and anchors, and perimeter sealing of storefront units.

1.02 SYSTEM DESCRIPTION

A. Storefront System Performance Requirements:
   1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures required by applicable codes.
   2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 at a static air pressure differential of 6.24 psf.

1.03 SUBMITTALS

A. Quality Assurance/Control Submittals:
   1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

B. Product Data: Manufacturer's descriptive literature for each component in all-glass entrance assembly.

C. Shop Drawings: Drawings showing layout, dimensions, identification of components, and interface with adjacent construction.

D. Verification Samples: Two samples, minimum size 2 by 3 inches, representing actual material and finish of exposed metal.

E. Certificates: Contractor's certification that installer of entrance assemblies meets specified qualifications.

F. Operation and Maintenance Data: For manufacturer-supplied operating hardware.

1.04 WARRANTY

A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.

B. Manufacturer's Product Warranty: Submit, for Owner's acceptance, manufacturer's warranty for storefront system as follows:
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment.

1.05 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
   2. Manufacturer Qualifications: Manufacturer capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

B. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Drawings and specifications are based on manufacturer's literature from Kawneer Company Inc. unless otherwise indicated. Other manufacturers to comply with the minimum levels of material and detailing indicated on the drawings and in the specifications and in conformance with provisions of Section 01 6000 – Product Requirements.

B. Basis of Design: Kawneer Company, Inc. www.kawneer.com
   1 Acceptable Product: Kawneer Aluminum Storefront Systems.
      a. Kawneer Aluminum Storefront System
      b. Series: Trifab® 451T medium stile, storefront system.
      c. Interior storefront: Flush glazed aluminum frames configured for single glazing.
      d. Exterior storefront: Thermally broken flush glazed aluminum frames configured for double glazing.
      e. Finish: Natural Clear or Black anodized as indicated in Door / Frame Assembly Schedule on Drawings.

C. Basis of Design is provided to establish a standard of quality and configuration and is not intended to preclude the use of accepted alternates.

D. Substitutions:
   1. In accordance with Section 01 6000 – Product Requirements.

2.02 MATERIALS

A. Aluminum Framing and Components:
   1. Material Standard: ASTM B 221; 6063-T6 alloy and temper
   2. Member Wall Thickness: Each framing member shall provide structural strength to meet specified performance requirements.
   3. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.03 FINISHES

A. Finish: AAMA 611 AA-M12C22A41 Anodic coating not less than 0.7 mils thick. Color as designated in the Finish Schedule.

2.04 HARDWARE

A. Door Hardware: As specified in Section 08 7100.

2.05 ACCESSORIES

A. Fasteners: Where exposed, shall be Stainless Steel.

B. Gaskets: Glazing gaskets shall be extruded EPDM rubber.

C. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.06 RELATED MATERIALS

A. Glazing: As specified in Section 08 8000.

2.07 FABRICATION

A. General:
   1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
   2. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
   3. Prepare components to receive anchor devices. Fabricate anchors.
   4. Arrange fasteners and attachments to conceal from view.

2.08 SOURCE QUALITY CONTROL

A. Source Quality: Provide aluminum storefront specified herein from a single source.
   1. Building Enclosure System: When aluminum storefront is part of a building enclosure system, including entrances, entrance hardware, windows, curtain wall system and related products, provide building enclosure system products from a single source manufacturer.

B. Fabrication Tolerances: Fabricate aluminum storefront in accordance with framing manufacturer's prescribed tolerances.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions. Verify openings are sized to receive storefront system and sill plate is level in accordance with manufacturer's acceptable tolerances.
   1. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

3.02 INSTALLATION

A. General: Install framing system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.
   1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
   2. Weathertight Construction: Install sill members and other members in a bed of sealant or with joint filler or gaskets, to provide weathertight construction. Coordinate installation with wall flashings and other components of construction.
   3. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
   4. Provide alignment attachments and shims to permanently fasten system to building structure.
   5. Align assembly plumb and level, free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.

3.03 PROTECTION AND CLEANING

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 08 56 53.13
WIND AND IMPACT SECURITY WINDOWS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Impact, Wind and Bullet Resistant Aluminum Security Windows.

1.2 ACTION SUBMITTALS

A. Refer to Section **01 33 00 Submittal Procedures**

B. Product Data: For each type of framing and glazing including manufacturer recommended installation instructions.

C. Shop Drawings: Include plans, elevations, sections, details, attachment to other work and glazing details for field-glazed units.

D. Samples: For each exposed finish.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: Indicating compliance with

1. ICC 500 – 2020 and FEMA P-361-2021 requirements
2. UL 752 Level 3

B. Qualification Data: For Installer and Testing Agency.

C. Warranty: Sample of finish warranty

D. Special Inspection Report: As indicated in Section 01 45 33 - Code-Required Special Inspections and Procedures

1.4 CLOSEOUT SUBMITTALS

A. Refer to Section 01 78 00 Closeout Submittals.

B. Maintenance data.

1.5 QUALITY ASSURANCE

A. Mock-up: Install framing assembly at project site. Obtain Architect's approval prior to proceeding with installation of remaining windows. Accepted mock-up may remain as portion of final work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Section 01 60 00 Product Requirements

1.7 WARRANTY

A. Finish Warranty: Manufacturer's warranty against deterioration of factory finishes for the period of 10 years from the date of Substantial Completion.

B. Glass Warranty: Manufacturer's warranty against defects in material and workmanship resulting in edge separation or delamination for a period of 5 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FRAMING

A. Basis of Design: Insulgard STORMDEFEND TTH600 Tornado and Hurricane Storm Shelter Window System by Insulgard Security Products; Phone 800.624.6315; website www.insulgard.com

1. Subject to compliance with requirements, manufacturers of products of equivalent design may be acceptable if approved in accordance with Section 01 25 00 Substitution Procedures.

B. Description

1. Factory fabricated framing constructed from either 6005-T5 or 6105-T5 extruded aluminum with integral weep design to allow water to vent to the exterior along horizontal members. Thermal separation of frame using polyamide strip.
2. Dimensions:

a. Head, Jamb, and Sill Members: 2-1/2 inches by 6 inches.
b. Mullion and Intermediate Horizontal Members: 3-1/4 inch face

3. Unit to be permanently marked with certification label of the certified testing agency acceptable to the authorities having jurisdiction. Label to include:

a. Design Pressure
b. Tested Pressure
c. Missile Criteria
d. ICC-500 (2020) Certification Listing

2.2 GLAZING

A. Glazing Material: Insulating Glass Clad Polycarbonate

1. Wind, Impact and Level 3 Ballistic Resistant Glazing: TOR-GARD 30 IG

2.3 PERFORMANCE CRITERIA

A. Indicated areas of this project have been designed for occupancy as a storm shelter. The Work identified in this Section is a component of that security occupancy as follows:

1. Type of Shelter: **Tornado**

Shelter Design Wind Speeds:

2. Tornado **250** MPH

B. Debris Hazard

1. FEMA P-361-**21** Compliant: Pass missile-impact tests according to FEMA P 361-21 / ICC 500-**2020** in accordance with:

a. ASTM E1886 - Standard Test Method For Performance Of Exterior Windows, Curtain Walls, Doors And Impact Protective Systems Impacted By Missiles and Exposed To Cyclic Pressure Differential

2. Tornado: Resists impact of a 15 pound 2 by 4 at **100** MPH for vertical surfaces.

C. Pressure Testing

1. FEMA P-361 Compliant: Pass static pressure tests and cyclic tests according to FEMA P-361-**2021**/ICC 500-**2020** in accordance with:
   a. ASTM E330 - Standard Test Method For Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

D. Ballistic Resistant: Level 3 in accordance with UL 752 – Standard for Bullet-Resisting Equipment.

E. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. NFRC Model Size: 47-1/4 by 59 inches
2. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.37 as determined according to NFRC 100.
3. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.45 as determined according to NFRC 200.
4. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 60 as determined according to NFRC 500.

2.4 FABRICATION

A. Tolerances: All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members

2.5 FRAMING FINISH

A. Factory-applied finish:

1. Clear Anodic Finish: Architectural Class I, clear coating AA-M10C22A41 Mechanical Finish Chemical Finish: etched, medium matte; 0.70 mils minimum complying with AAMA 611 "Voluntary Specification for Anodized Architectural Aluminum"
2. Color Anodic Finish: Architectural Class I, color coating AA-M10C22A42/A44 Mechanical Finish Chemical Finish: etched, medium matte; 0.70 mils minimum complying with AAMA 611 "Voluntary Specification for Anodized Architectural Aluminum".

    a. Color: Dark Bronze.

3. PVDF-Based Coating: Fluoropolymer finish containing minimum 70 percent PVDF resins, in accordance with AAMA 2605 “Voluntary Specification, Performance Requirements and Test Procedures for Superior Performance Organic Coatings on Aluminum Extrusions and Panels”

    a. Coats: three coat system,
    b. Color to be selected from manufacturer's full color range.

2.6 ACCESSORIES

A. Anchors: Fully concealed in accordance with performance requirements

B. Glazing Gaskets: Manufacturer supplied EPDM gasket utilized as component of the tested assembly.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify field dimensions of opening prior to fabrication of windows.

B. Coordinate structural requirements to ensure proper attachment and support.

3.2 INSTALLATION

A. Install windows in accordance with manufacturer's recommendations and approved shop drawings.

B. Provide required support and securely fasten and set windows plumb, square, and level without twist or bow.

C. Apply sealant in accordance with window and sealant manufacturer's recommendations as indicated in installation instructions. Wipe off excess, and leave exposed sealant surfaces clean and smooth

3.3 CLEANING

A. Clean in strict accordance with manufacturer's recommended cleaning procedures using recommend cleaning agents.

3.4 PROTECTION

A. Protect windows from damage during construction operations. If damage occurs, remove and replace as required to provide windows in their original, undamaged condition.

1. In addition to breakage, damage includes but is not limited to crazing, cracking, fissures and delamination.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. "Metal Doors and Frames"
   b. "Flush Wood Doors"
   c. "Stile and Rail Wood Doors"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 - 2017 Edition - Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames
6. T.A.S. - Texas Accessibility Standards

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:

a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
c. Indicate complete designations of each item required for each opening, include:
    1) Door Index: door number, heading number, and Architect's hardware set number.
    2) Quantity, type, style, function, size, and finish of each hardware item.
    3) Name and manufacturer of each item.
    4) Fastenings and other pertinent information.
    5) Location of each hardware set cross-referenced to indications on Drawings.
    6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    7) Mounting locations for hardware.
    8) Door and frame sizes and materials.
    9) Degree of door swing and handing.
    10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
    a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
    a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
    a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.
    c. Final approved hardware schedule edited to reflect conditions as installed.
    d. Final keying schedule

e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. Fire door assemblies, in compliance with NFPA 80.
   b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105

b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    a. Mechanical Warranty
        1) Locks
            a) Schlage L Series: 10 years
        2) Exit Devices
            a) Von Duprin: 10 years
        3) Closers
            a) LCN 4000 Series: 30 years
        4) Automatic Operators
            a) LCN: 2 years
    b. Electrical Warranty
        1) Locks
            a) Schlage: 3 year
        2) Exit Devices
            a) Von Duprin: 3 year
        3) Closers
            a) LCN: 2 years

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."

1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer’s recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Stile and Rail Wood Doors” to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.

2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 5BB series

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
   b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
6. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

8. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Zero

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 DOOR CORDS

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Locknetics DC Series

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide door cords with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage L9000 series

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:
   a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
   b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
   c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
   d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
   e. Connections – provide quick-connect Molex system standard.

8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. Lever Design: 17N.

2.08 DEADBOLTS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage B600/B700/B800 Series

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide grade 1 deadbolt series conforming to ANSI/BHMA A156.
2. Cylinders: Refer to "KEYING" article, herein.

3. Provide deadbolts with standard 2-3/4 inches (70 mm) backset. Provide 2-3/8 inches (60 mm) where noted or if door or frame detail requires. Provide deadbolt with full 1-inch (25 mm) throw, constructed of steel alloy.
4. Provide manufacturer's standard strike.

2.09 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Von Duprin 99 series

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:
    a. SI
       1) Provide dogging indicators for visible indication of dogging status.
    b. XP
       1) Rim Exit Devices: where specified provide devices with non-tapered smart latchbolt with 90° latchbolt to strike engagement under stress and Static Load Resistance of 2000 pounds.

2.10 ACCESS CONTROL READER

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage MT/MTK Series

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide access control card readers manufactured by a global company who is a recognized leader in the production of access control devices. Card reader manufactured for non-access control applications are not acceptable
2. Provide multi-technology contactless readers complying with ISO 14443.

2.11 ACCESS CONTROL PLATFORM

A. Manufacturers and Products:

1. Scheduled Manufacturer:
   a. Section by Div 28

2.12 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Section by Div 28

2.13 [FOR NEW CONSTRUCTION] CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage Everest 29 R

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer’s series as indicated. Refer to “KEYING” article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
   a. Patented Restricted Small Format: cylinder with small format interchangeable cores (SFIC) with restricted, patented keyway.

3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.14 [FOR NEW CONSTRUCTION] KEYING

A. Scheduled System:

1. Existing factory registered system:
   a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 2 construction control keys
         b) 15 construction change (day) keys.
      2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.
      3) Return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
      2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
      3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
   d. Identification:
      1) Mark permanent cylinders/cores and keys with applicable key set symbols for identification. Do not provide key set symbols marks with bitting codes.
      2) Identification stamping provisions must be approved by the Architect and Owner.
      3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; Stamp permanent keys "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection. Do not include bitting within visual key control marks or codes.
      4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
      5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
      6) Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
      7) Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
         a) Contact Lock Supervisor, David Davis.
         b) Phone: 214-762-3579
         c) Address: 3701 South Lamar Street, Dallas, TX 75215
   e. Quantity: Furnish in the following quantities.
      1) Permanent Control Keys: 2.

2) Master Keys to include all levels: 4 each.
3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
4) Key Blanks: Quantity as determined in the keying meeting.

2.15 KEY CONTROL SYSTEM

A. Manufacturers:

1. Acceptable Manufacturers:
   a. Key Control
   b. Lund
   c. Telkee

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
   a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
   b. Provide hinged-panel type cabinet for wall mounting.

2.16 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4040XP series

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.

9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.17 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.18 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.19 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson 900/100 Series

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.20 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. No Substitute

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.21 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Zero International

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.22 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:

a. No Substitute

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.23 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Schlage

2. Acceptable Manufacturers:
   a. No Substitute

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.24 COAT HOOKS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. No Substitute

B. Provide coat hooks as specified.

2.25 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Exit Devices: Install exit devices with sex, nuts and bolts through all doors.

J. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.

3. Furnish permanent cores to Owner for installation.

K. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

L. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

M. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds: Set thresholds in full bed of exterior grade caulk complying with requirements specified in Division 07 Section "Joint Sealants."

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction. Install all door closers with thru-bolts and adjust after HVAC is in operation.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Version 2

Legend:
Link to catalog cut sheet

Hardware Group No. 103

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050HD 17N L583-363		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

Hardware Group No. 201

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	STOREROOM LOCK	L9080HD 17N		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

Hardware Group No. 201C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	STOREROOM LOCK	L9080HD 17N		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

Hardware Group No. 203

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	STOREROOM LOCK	L9080HD 17N		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

Hardware Group No. 341

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	PRIVACY LOCK W/ OUTSIDE INDICATOR	L9040 17N 17N L583-363 OS-OCC		626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

-OCCUPIED/VACANT INDICATOR ON OUTSIDE OF DOOR.

Hardware Group No. 401C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	PASSAGE SET	L9010 17N		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

Hardware Group No. 403

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	PASSAGE SET	L9010 17N		626	SCH
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

Hardware Group No. 403S

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	PASSAGE SET	L9010 17N		626	SCH
1	EA	SURFACE OH STOP	900S SERIES X SIZE & MOUNTING AS REQ		630	GLY
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

Hardware Group No. 541

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	L9071HD 17N IS-LOC		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

-LOCKED/UNLOCKED INDICATOR ON INSIDE OF DOOR.

Hardware Group No. 541GHW

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	L9071HD 17N IS-LOC		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER WITH HOLD OPEN	4040XP H (HEDA @ PA) TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J		BK	ZER
1	EA	AUTO DOOR BOTTOM	355/360AA-Z49 TYPE AS REQ		AA	ZER
1	EA	THRESHOLD	545A (COORDINATE WITH SILL CONDITIONS)		A	ZER

-LOCKED/UNLOCKED INDICATOR ON INSIDE OF DOOR.

Hardware Group No. 541H

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	L9071HD 17N IS-LOC		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER WITH HOLD OPEN	4040XP H (HEDA @ PA) TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

-LOCKED/UNLOCKED INDICATOR ON INSIDE OF DOOR.

Hardware Group No. 541HW

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	L9071HD 17N IS-LOC		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER WITH HOLD OPEN	4040XP H (HEDA @ PA) TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

-LOCKED/UNLOCKED INDICATOR ON INSIDE OF DOOR.

Hardware Group No. 543S

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	CLASSROOM SECURITY W/ INSIDE INDICATOR	L9071HD 17N IS-LOC		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE OH STOP	900S SERIES X SIZE & MOUNTING AS REQ		630	GLY
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER

-LOCKED/UNLOCKED INDICATOR ON INSIDE OF DOOR.

Hardware Group No. 730M

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954 STAB HEIGHT AS REQ		689	VON
2	EA	PANIC HARDWARE	99-L-BE-17-SNB LENGTH AS REQ		626	VON
1	EA	SFIC MORTISE CYLINDER	80-132 W/KEYED CONST. CORE		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
2	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
2	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER
1	EA	MEETING STILE	8193AA (2 PCS - 1 SET) (OMIT @ NON-RATED DOORS)		AA	ZER
1	EA	MULLION SEAL	8780N PSA HEIGHT AS REQ		BK	ZER

Hardware Group No. C201

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	POWER TRANSFER	POWER TRANSFER BY SECURITY CONTACTOR			
1	EA	EU MORTISE LOCK	ELEC LOCK BY SECURITY CONTACTOR			SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER
1	EA	WIRE HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ			SCH
1	EA	WIRE HARNESS (TO POWER SUPPLY)	WIRE HARNESS (TO POWER SUPPLY) BY SECURITY CONTRACTOR			SCH
1	EA	MULTITECH READER	READER BY SECURITY CONTACTOR			
1	EA	DOOR CONTACT	DOOR CONTACT(S) BY SECURITY CONTRACTOR		WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY BY SECURITY CONTACTOR		LGR	SCE

-INGRESS BY THE CREDENTIAL READER OR KEY OVERRIDE.
-EGRESS BY THE LEVER.

-ELECTRIFIED HARDWARE AND COMPONENTS PROVIDED AND INSTALLED BY SECURITY CONTRACTOR.

Hardware Group No. C201C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	POWER TRANSFER	POWER TRANSFER BY SECURITY CONTACTOR			
1	EA	EU MORTISE LOCK	ELEC LOCK BY SECURITY CONTACTOR			SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER
1	EA	WIRE HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ			SCH
1	EA	WIRE HARNESS (TO POWER SUPPLY)	WIRE HARNESS (TO POWER SUPPLY) BY SECURITY CONTRACTOR			SCH
1	EA	MULTITECH READER	READER BY SECURITY CONTACTOR			
1	EA	DOOR CONTACT	DOOR CONTACT(S) BY SECURITY CONTRACTOR		WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY BY SECURITY CONTACTOR		LGR	SCE

-INGRESS BY THE CREDENTIAL READER OR KEY OVERRIDE.
-EGRESS BY THE LEVER.
-ELECTRIFIED HARDWARE AND COMPONENTS PROVIDED AND INSTALLED BY SECURITY CONTRACTOR.

Hardware Group No. C714M

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY EPT		628	IVE
2	EA	POWER TRANSFER	POWER TRANSFER BY SECURITY CONTACTOR			
1	EA	KEYED REMOVABLE MULLION	KR4954XP STAB HEIGHT AS REQ		689	VON
1	EA	PANIC HARDWARE	99-L-BE-17-SNB LENGTH AS REQ		626	VON
1	EA	ELEC PANIC HARDWARE	ELEC PANIC BAR BY SECURITY CONTACTOR		626	VON
1	EA	SFIC MORTISE CYLINDER	80-132 W/KEYED CONST. CORE		626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	DOOR PULL	VR910 DT		630	IVE
1	EA	DOOR PULL	VR910 NL		630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH X TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA DW + 4" (OMIT @ COVERED OPENINGS)		AA	ZER
1	SET	SEALS	328AA H & J		AA	ZER
1	EA	MEETING STILE	8193AA (2 PCS - 1 SET)		AA	ZER
1	EA	MULLION SEAL	8780N PSA HEIGHT AS REQ		BK	ZER
2	EA	DOOR SWEEP	8198AA		AA	ZER
1	EA	THRESHOLD	65A		A	ZER
2	EA	WIRE HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ			SCH
2	EA	WIRE HARNESS (TO POWER SUPPLY)	WIRE HARNESS (TO POWER SUPPLY) BY SECURITY CONTRACTOR			SCH
1	EA	MULTITECH READER	READER BY SECURITY CONTACTOR			
2	EA	DOOR CONTACT	DOOR CONTACT(S) BY SECURITY CONTRACTOR		WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY BY SECURITY CONTACTOR			VON

-INGRESS BY THE CREDENTIAL READER OR KEY OVERRIDE.
-EGRESS BY THE PUSH PADS.

-ELECTRIFIED HARDWARE AND COMPONENTS PROVIDED AND INSTALLED BY SECURITY CONTRACTOR

Hardware Group No. C770MV

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY EPT		628	IVE
2	EA	POWER TRANSFER	POWER TRANSFER BY SECURITY CONTRACTOR		689	VON
1	EA	KEYED REMOVABLE MULLION	KR4954 STAB HEIGHT AS REQ		689	VON
1	EA	PANIC HARDWARE	99-L-BE-17-SNB LENGTH AS REQ		626	VON
1	EA	ELEC PANIC HARDWARE	ELEC PANIC BAR BY SECURITY CONTRACTOR		626	VON
1	EA	SFIC MORTISE CYLINDER	80-132 W/KEYED CONST. CORE		626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
2	EA	DOOR PULL	VR910 DT		630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH X TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER
1	EA	MEETING STILE	8193AA (2 PCS - 1 SET) (OMIT @ NON-RATED DOORS)		AA	ZER
1	EA	MULLION SEAL	8780N PSA HEIGHT AS REQ		BK	ZER
2	EA	WIRE HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ			SCH
2	EA	WIRE HARNESS (TO POWER SUPPLY)	WIRE HARNESS (TO POWER SUPPLY) BY SECURITY CONTRACTOR			SCH
1	EA	MULTITECH READER	READER BY SECURITY CONTRACTOR		BLK	SCE
2	EA	DOOR CONTACT	DOOR CONTACT(S) BY SECURITY CONTRACTOR		WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY BY SECURITY CONTACTOR			VON

-INGRESS BY THE CREDENTIAL READER.
-EGRESS BY THE PUSH PADS.

-ELECTRIFIED HARDWARE AND COMPONENTS BY SECURITY CONTRACTOR.

Hardware Group No. CR207LT

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	POWER TRANSFER	POWER TRANSFER BY SECURITY CONTRACTOR			VON
1	EA	EU MORTISE LOCK	ELEC LOCK BY SECURITY CONTRACTOR			SCH
1	EA	DBL CYL DEADBOLT	B662HD 12-631		626	SCH
3	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE OH STOP	900S SERIES X SIZE & MOUNTING AS REQ		630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER
1	EA	WIRE HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ			SCH
1	EA	WIRE HARNESS (TO POWER SUPPLY)	WIRE HARNESS (TO POWER SUPPLY) BY SECURITY CONTRACTOR			SCH
1	EA	MULTITECH READER	READER BY SECURITY CONTRACTOR		BLK	SCE
1	EA	REMOTE RELEASE	REMOTE RELEASE BY SECURITY CONTRACTOR		628	SCE
1	EA	DOOR CONTACT	DOOR CONTACT(S) BY SECURITY CONTRACTOR		WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY BY SECURITY CONTACTOR		LGR	SCE

-INGRESS BY THE CREDENTIAL READER, REMOTE RELEASE, OR KEY OVERRIDE.
-EGRESS BY THE LEVER.
-DEADBOLT TO LOCK DOWN ADMIN AREA AFTER HOURS.

- ELECTRIFIED HARDWARE AND COMPNENTS BY SECURITY CONTRACTOR.

Hardware Group No. D710MV

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY EPT		628	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954 STAB HEIGHT AS REQ		689	VON
2	EA	PANIC HARDWARE	99-L-BE-17-SNB LENGTH AS REQ		626	VON
1	EA	SFIC MORTISE CYLINDER	80-132 W/KEYED CONST. CORE		626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE		626	SCH
2	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	DOOR PULL	VR910 DT		630	IVE
1	EA	DOOR PULL	VR910 NL		630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH X TBWMS X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER
1	EA	MEETING STILE	8193AA (2 PCS - 1 SET) (OMIT @ NON-RATED DOORS)		AA	ZER
1	EA	MULLION SEAL	8780N PSA HEIGHT AS REQ		BK	ZER
2	EA	DOOR CONTACT	DOOR CONTACT(S) BY SECURITY CONTRACTOR		WHT	SCE

-DOORS MONITORED ONLY.

Hardware Group No. R207T

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 (PROVIDE NRP @ OUTSWING, LOCKABLE DOORS)		652	IVE
1	EA	POWER TRANSFER	POWER TRANSFER BYSECURITY CONTRACTOR			VON
1	EA	EU MORTISE LOCK	ELEC LOCK BY SECURITY CONTRACTOR			SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE OH STOP	900S SERIES X SIZE & MOUNTING AS REQ		630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)		BK	ZER
1	EA	WIRE HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ			SCH
1	EA	WIRE HARNESS (TO POWER SUPPLY)	WIRE HARNESS (TO POWER SUPPLY) BY SECURITY CONTRACTOR			SCH
1	EA	REMOTE RELEASE	REMOTE RELEASE BY SECURITY CONTRACTOR		628	SCE
1	EA	DOOR CONTACT	DOOR CONTACT(S) BY SECURITY CONTRACTOR		WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY BY SECURITY CONTACTOR		LGR	SCE

-INGRESS BY THE REMOTE RELEASE, OR KEY OVERRIDE.
-EGRESS BY THE LEVER.

-ELECTRIFIED HARDWARE AND COMPONENTS BY SECURITY CONTRACTOR.

Hardware Group No. T758.2

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
2	EA	PANIC HARDWARE	LD-WS-T-9927-L-BE-2SI-17-377T-KC-SNB LENGTH & HEIGHT AS REQ		626	VON
2	EA	ROD AND LATCH GUARD	WS-LGO LENGTH AS REQ		630	VON
2	EA	SFIC MORTISE CYLINDER	80-132 W/KEYED CONST. CORE		626	SCH
2	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE		626	SCH
4	EA	SFIC EVEREST CORE	80-037 EV29 R		626	SCH
2	EA	SURFACE CLOSER	4040XP RW/PA X TBWMS X MTG BRKT, SPCR & PLATE AS REQ (EDA @ 180 DEGREE SWING)		689	LCN
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES AS REQ		689	LCN
1	EA	GASKETING	488S PSA H & J		BK	ZER
1	EA	MEETING STILE	8193AA (2 PCS - 1 SET)		AA	ZER
1	EA	POWER SUPPLY	POWER SUPPLY BY SECURITY CONTACTOR		LGR	SCE

-FOR USE WITH STEELCRAFT PALADIN DOOR ASSEMBLY.
-MEETS ICC 500-2020 AND FEMA 320/361.
-MAXIMUM DOOR SIZE 4'0 X 8'0 (SINGLE) AND 8'0 X 8'0 (PAIR).
-IF ANOTHER DOOR MFR. IS USED CONSULT WITH THEM FOR APPROVED HARDWARE, DOORS AND HARDWARE ARE SOLD AS A COMPLETE TESTED ASSEMBLY.
-GC TO PROVIDE SIGNAGE THAT MEETS ICC 500-2020 REQUIREMENTS, AS NEEDED.

-PROVIDE 120VAC AND FIRE ALARM CONNECTIONS FOR WALL MAGNETIC HOLD OPENS.
-WIRE THE MAGNETIC HOLD OPENS TO THE FIRE ALARM SYSTEM.
-THE MAGNETIC HOLD OPENS ARE TO RELEASE UPON ACTIVATION OF THE FIRE ALARMS SYSTEM.
-COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL.
-OMIT WHERE PROVIDED BY SECURITY.

-2SI "UNLOCKED":
-OUTSIDE LEVER IS ACTIVE WHEN -2SI IS SET TO "UNLOCKED" STATE.
-INGRESS BY OUTSIDE LEVER.
-FREE EGRESS BY THE PUSH PADS.

-2SI "LOCKED":
-OUTSIDE LEVER IS RIGID WHEN -2SI IS SET TO "LOCKED" STATE.
-THUMBTURN IS RIGID.
-INGRESS BY KEY OVERRIDE.
-TURN KEY TO ACTIVATE CYLINDER CONTROL.
-ROTATE CYLINDER CONTROL THUMBTURN TO RETRACT LATCHBOLTS.
-PULL RIGID LEVER TO OPEN DOOR.
-CANNOT REMOVE KEY IN 377T-KC (KEY CAPTURE) CYLINDER CONTROL WHILE ACTIVATED.
-FREE EGRESS BY THE PUSH PADS.

END OF SECTION

SECTION 08 8000

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing materials for windows, doors, storefront and curtainwalls.

B. Glazing compounds and accessories.

1.02 RELATED SECTIONS

A. Section 07 9000 - Joint Sealers: Sealant and back-up material.

B. Section 08 1213 – Hollow Metal Doors and Frames: Glazing for doors.

C. Section 08 1416 – Flush Wood Doors: Glazing for doors.

C. Section 08 4113 – Aluminum-Framed Storefront: Glazing for storefronts.

D. Section 08 4413 – Glazed Aluminum Curtain Walls: Glazing for curtainwalls.

E. Section 08 5113 – Aluminum Windows: Glazing for aluminum windows.

1.03 REFERENCES

A. ASTM C 1036 - Standard Specification for Flat Glass; current edition.

B. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; current edition.

C. ASTM C 1193 - Standard Guide for Use of Joint Sealants; current edition.

D. ASTM E 1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; current edition.

E. GANA (GM) - GANA Glazing Manual; Glass Association of North America; current edition.

F. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; current edition.

1.04 PERFORMANCE REQUIREMENTS

A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with materials described in Section 07 9200 and 08 4113.
   2. To utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
   3. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

B. Select type and thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with applicable code.
   1. Use the procedure specified in ASTM E 1300 to determine glass type and thickness.
   2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   3. Thicknesses listed are minimum.

1.05 SUBMITTALS

A. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, and special handling or installation requirements.

B. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

C. Samples of each glass type indicating color and tint properties.

D. Manufacturer's Certificate: Certify that glass meets or exceeds specified requirements.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. Provide a five (5) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

B. Provide a five (5) year warranty to include coverage for de-lamination of laminated glass and replacement of same.

C. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manufacturers:
1. Basis of Design: Guardian Glass; www.guardianglass.com
2. AFG Industries, Inc: www.afgglass.com.
3. Pilkington Building Products North America: http://buildingproducts.us.pilkington.com.
4. PPG Industries, Inc: www.ppg.com.
5. Viracon: www.viracon.com.
6. Basis of Design is provided to establish a standard of quality and configuration and is not intended to prevent the use of approved alternates.
75. Substitutions: Permitted under provisions of Section 01 6000 - Product Requirements.

B. Acid Etched Glass: #25 Guardian SatinDeco Acid-etched Glass, ¼-inch thick.

C. Spandrel Glass: #31 Guardian Sunguard Spandrel HT – Black.

B. Monolithic Clear Float Glass: Clear, annealed.
1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality q3 glazing select, ¼-inch thick, minimum.

C. Safety Glass: Clear; tempered with horizontal tempering.
1. Comply with ASTM C 1048, Kind FT (Fully Tempered), Type II, transparent flat, Class 1, Quality Q-6, Form 3, ¼”-inch-thick minimum.

D. Insulating Glass Units: Nominal 1-inch-thick units (0.25”+0.5” air space +0.25”) double laminated insulating VE19-2M (STC 42).
   1. Comply with ASTM E2160 Standard Specification for Insulating Glass Unit Performance and Evaluation.
   2. The unit overall thickness tolerance shall be -1/16”/ +1/32”.
   3. Sealed insulating glass units to be double sealed with a primary seal of polyisobutylene and a secondary seal of silicone.
   4. Summer U Value – 0.29.
   5. SHGC – 0.25.
   6: Guardian Gray Float, #10 Superneutral 68 on Gray, coated #2 surface.

E. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides.

F. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S, Grade NS, Class 25 with additional movement capable of 50 percent in both extension and compression. Dow Corning 795.
   1. Dow Corning 795.
   2. General Electric Silglaze-II 2800.
   3. Tremco Sprectrem 2.

G. Setting Blocks: Neoprene, EPDM or silicone tested for compatibility with glazing compound.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C 1193 and FGMA Sealant Manual.

E. Install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install glass in accordance with recommendations and procedures in GANA Glazing Manual and FGMA Sealant Manual.

B. Install glass in accordance with storefront frame manufacturer recommendations and instructions.

C. Install glass with lines or waves horizontal.

3.04 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.05 PROTECTION OF FINISHED WORK

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 08 8723
SAFETY AND SECURITY FILMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazing film applied to existing and new glazing assemblies.

B. Wet Glaze Anchoring System.

C. New Glazing: Factory or shop install film to glazing before installation in frames.

D. Glazing assemblies to receive film are indicated on drawings.

1.02 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames: New doors and windows with glazing to receive film.

B. Section 08 8000 - Glazing: New glazing to received film.

1.03 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 D 882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

D. ASTM D 1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.

E. ASTM D 1044 - Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test).

F. ASTM D 2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.

G. ASTM D 4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.

H. ASTM E 84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.

I. ASTM E 308 - Standard Recommended Practice for Spectophotometry and Description of Color in CIE 1931 System.

J. ASTM E 903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.

K. ASTM E 1886 - 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.

L. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

M. Window 5.2 - A Computer Tool for Analyzing Window Thermal Performance; Lawrence Berkeley Laboratory.

N. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

O. Consumer Products Safety Commission 16 CFR, Part 1201 - Safety Standard for Ownerural Glazing Materials.

P GSA Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings.

Q. ISO 16933, International Standard for Glass in Building: Explosion-resistant security glazing - Test and classification for arena air-blast testing.

R. Underwriters Laboratories Inc. (UL): UL 972 - Burglary Resisting Glazing Material.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Record of product certification for safety requirements.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.

C. Shop Drawings: Detailing installation of film, anchoring accessories, and sealant.

D. Samples: For each film product to be used, minimum size 4 inches (102 mm) by 6 inches (152 mm), representing actual product, color, and patterns.

E. Test Reports: Detailed reports of full-scale chamber tests to specified criteria, using assemblies identical to those required for this project.

F. Specimen Warranty.

1.05 PERFORMANCE REQUIREMENTS

A. Fire Performance: Surface burning characteristics when tested in accordance ASTM E 84:
   5. Flame Spread: 25, maximum.
   6. Smoke Developed: 450, maximum.

B. Abrasion Resistance: Film must have a surface coating that is resistant to abrasion such that, less than 5 percent increase of transmitted light haze will result in accordance with ASTM D 1044 using 50 cycles, 500 grams weight, and the CS10F Calbrase Wheel.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications (SUBMIT WITH PROPOSAL): All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

B. Installer Qualifications (SUBMIT # 1 AND #2 WITH PROPOSAL): All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
   1. Provide documentation that the installer is authorized by the Manufacturer to perform Work specified in this section.
   2. Provide a commercial building reference list of 5 properties where the installer has applied window film. This list will include the following information:
      a. Name of building.

b. The name and telephone number of a management contact.
c. Type of glass.
d. Type of film.
e. Amount of film installed.
f. Date of completion.

3. Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film manufacturer.
4. Provide an application analysis to determine available energy cost reduction and savings.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.08 PROJECT 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.

1.09 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed current copy of the manufacturer's 12 year warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Madico, Inc; Safety Shield 800 DG 45 PS SR : www.madico.com/#sle.

B. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

C. 3M Window Film, St. Paul, MN.

D. Armor Glass, San Diego, CA

E. Solar Gard, Saint-Gobain, Houston, TX

F. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SAFETY AND SECURITY GLAZING FILM

A. Clear Safety and Security Window Film: 8 Mil Clear Safety and Security Window Film. Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The film may be laminated to other clear polyester film layers to achieve the desired thickness of the film.
   1. Physical / Mechanical Performance Properties:
      a. Film Color: Clear.
      b. Tensile Strength (ÅSTM D 882): 30,000 psi.
      c. Break Strength (ASTM D 882) (Per Inch Width): 240 lbs.
      d. ASTM D 4830 Puncture Test: 141 lbs.
   2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.

3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.
5. Solar Performance Properties: Film applied to 1/4 Inch (6.4 mm) thick clear glass.
    a. Visible Light Transmission (ASTM E 903) (Exterior): 13 percent.
    b. Visible Light Transmission (ASTM E 903) (Interior): 12 percent.
    c. Emissivity: .88.
    d. U-Factor (Winter): 1.11.
    e. Shading Coefficient: .87.
    f. Ultraviolet Light Blocked: Greater than 99 percent.
    g. Solar Heat Gain Coefficient (ÅSTM E 903): 0.74.
6. Windstorm Protection
    a. Film shall pass impact of Medium Large Missile "C" and withstand subsequent pressure cycling (per ASTMs E 1996 and E 1886) at 50 psf Design Pressure with use of Adhesive attachment system.
7. Bomb Blast Mitigation: Independent testing with results from high explosive arena blast testing.
    a. GSA Rating with minimum blast pressure and impulse of 7 psi and 36 psi.msec, respectively: “3B” (Low Hazard / High Protection).
    b. GSA Rating with minimum blast pressure and impulse of 11 psi and 55 psi.msec, respectively: “3B” (Low Hazard / High Protection).
8. Forced Entry Protection: Independent lab testing according to UL 972 protocol (Multiple Impact Test).
    a. Annealed Glass (1/4 inch) - Pass
    b. Tempered Glass (1/4 inch) - Pass

2.03 ATTACHMENT SYSTEMS

A. General: Subject to compliance with testing and performance requirements, provide the following perimeter attachment system.

B. Wet-glaze: 4-sided Wet Glaze Anchoring System to achieve a GSA level 3A performance condition (with SafetyShield 800 film) when tested to open range blast loads of 9.0 psi and 46.0 PSI-ms on monolithic annealed glass.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine glass and frames. Verify that existing conditions are adequate for proper application and performance of film.

B. Verify glass is not cracked, chipped, broken, or damaged.

C. Verify that frames are securely anchored and free of defects.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean glass of dust, dirt, paint, oil, grease, mildew, mold, and other contaminants that would inhibit adhesion.

B. Immediately prior to applying film, thoroughly wash glass with neutral cleaning solution.

C. Protect adjacent surfaces.

D. Do not begin installation until substrates have been properly prepared.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch of window sealant. Use new blade tips after 3 to 4 cuts.

C. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, on window glass and adhesive to facilitate proper positioning of film.

D. Apply film to glass and lightly spray film with slip solution.

E. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.

F. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.

G. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.04 CLEANING AND PROTECTION

A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

END OF SECTION

SECTION 09 2116

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling and suspended grid framing.

C. Gypsum wallboard.

D. Joint treatment and accessories.

E. Textured finish system.

1.02 REFERENCES

A. AISI SG-971 - Specification for the Design of Cold-Formed Steel Structural Members; current edition.

B. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; current edition.

C. ASTM C 36 - Standard Specification for Gypsum Wallboard; current edition.

D. ASTM C 475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; current edition.

E. ASTM C 514 - Standard Specification for Nails for the Application of Gypsum Board; current edition.

F. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; current edition.

G. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; current edition.

H. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; current edition.

I. ASTM C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. to 0.112 in. in Thickness; current edition.

J. ASTM C 1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; current edition.

K. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; current edition.

L. ASTM C 1396 - Standard Specification for Gypsum Board; current edition.

M. GA-600 - Fire Resistance Design Manual; Gypsum Association; current edition.

1.03 SUBMITTALS

A. Shop Drawings:
   1. Show locations, fabrication, and installation of control and expansion joints, in accordance with Gypsum Association Standards unless otherwise approved by Architect in writing. Include plans, elevations, sections, details of components, and attachments to other units of Work. Indicate special details associated with acoustic seals.

B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

D. Submit keyed plan showing all control joints per 3.04 this specification section.

1.04 REGULATORY REQUIREMENTS

A. A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:

1. Gypsum board partitions:

a. Standard systems: Maximum deflection of L/240 of partition height.

b. Systems to receive water resistant gypsum board or backer board: Maximum deflection of L/360 of partition height.

2. Interior suspended ceilings and soffits: Maximum deflection of L/360 of distance between supports.

3. Exterior soffits (if shown): Withstand minimum positive and negative pressure of 20 psf with maximum deflection of L/360 of distance between supports.

4. TALL WALLS (partitions exceeding 30'-0")

a. Use double structural studs back-to-back 24 inches on center. Attach studs back-to-back with screws approximately 4 feet on center.

b. For 5-psf wind load, provide 20-gauge runner track. Fasteners shall have a capacity of 300 pounds in single shear and bearing.

c. For 10-psf wind load, provide 18-gauge runner track attached with fasteners with 400-pound single shear and bearing.

B. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction shown.

C. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM E90.

D. Design framing systems in accordance with AISI S220 and ASTM C645, Section 10, unless otherwise indicated.

1.05 QUALITY ASSURANCE

A. Contractor is responsible for design, engineering and construction of the gypsum board assemblies, including framing. Contractor may increase framing gage, reduce stud spacing or flange width as required to carry loads and span dimensions. Depth of stud web may not be changed without Architect’s approval.

B. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.

C. Applicator Qualifications: Company specializing in performing gypsum board application and finishing, with minimum five years of documented experience.

D. Gypsum that becomes wet from spills, weather or mechanical failure shall be replaced by Contractor at no cost to Owner.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver material to site promptly without undue exposure to weather.

B. Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.

C. Store above ground in dry, ventilated space. Protect materials from soiling, rusting and damage.

D. Store board to be directly applied to masonry walls at 70°F for 24 hours prior to installation.

E. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold- Formed Steel Framing."

F. Store gypsum boards off the ground, preferably on a platform or pallets, to avoid contact with water from the floor.

1.07 PROJECT CONDITIONS

A. Do not install gypsum board when the ambient temperature is below 40°F. Maintain a consistent temperature between 45°F and 60°F, and ensure proper ventilation to remove excess moisture.

B. For adhesive attachment and finishing of gypsum board, keep the ambient temperature above 55°F starting one week before installation or joint treatment, and continue until the joint treatment is fully applied and dried.

C. During cold weather, the building shall be heated while gypsum board and joint treatment are being applied.

1.08 WARRANTY

A. Warrant the work specified for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. In addition, provide warranty from the manufacturer for the following products:
1. Exterior sheathing weathering warranty covering in-place exposure damage to exterior sheathing for twelve (12) months.
2. Exterior sheathing warranty against manufacturing defects for five (5) years.
3. Abuse Resistant Panel weathering warranty covering in-place exposure damage to sheathing for six (6) months.
4. Abuse Resistant Panel warranty against manufacturing defects for three (3) years.
5. Glass-mat sheathing weathering warranty covering in-place exposure damage to sheathing for three (3) months.
6. Glass-mat sheathing warranty against manufacturing defects for three (3) years.
7. Tile backer board warranty against manufacturing defects for 20 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

B. Manufacturers listed whose product meets or exceed the specifications may be used 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 1 requirements regarding substitutions in order to be considered.

1. Gypsum Board and Related Products:
   a. G-P Gypsum Corp.
   b. Gold Bond Building Products Div., National Gypsum Co.
   c. Lafarge Gypsum
   d. United States Gypsum Co.
   e. Waterguard USA

2. Steel Framing and Furring:
   a. Clark Steel Framing Systems: www.clarksteel.com.
   b. Dale/Incor: www.daleincor.com.
   c. Dietrich Metal Framing, Inc: www.dietrichmetalframing.com.
   d. Marino-Ware: www.marinoware.com.

3. Aluminum Moldings:
   a. Fry Reglet Corporation
   b. MM Systems Corporation

2.02 STEEL FRAMING CEILINGS AND SOFFITS

B. Comply with ASTM C 754 for materials and sizes, unless otherwise indicated.

1. Protective Coating: Comply with AISI S220; ASTM A653/A653M, G40 (Z120) or equivalent corrosion resistance. A40 galvannealed products are not acceptable.
   a. Coating shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

C. Hanger and Tie Wire: ASTM A 641, Class 1 zinc-coating, soft temper.

D. Hanger Rods: Mild steel, zinc coated.

E. Flat Hangers: Mild steel, zinc coated.

F. Angle-Type Hangers: Angles with legs not less than 7/8 inch wide, formed from 0.0296-inch-thick galvanized steel sheet per ASTM A 653, G 60 coating, with bolted connections and 5/16 inch diameter bolts.

G. Carrying Channels: ASTM C 754, shall be cold formed from steel with a 0.0538 inch (1.37 mm) minimum base metal thickness and 1/2 inch (12.7 mm) wide flanges, as follows:

1. Depth: 1-1/2 inches or other as noted on the drawings

H. Steel Studs for Furring Channels: AISI S220 and ASTM C645, Section 10.

1. Subject to compliance with requirements, provide ClarkDietrich; ProSTUD 25 gauge-equivalent (0.0150 inch) with Smart Edge technology, or comparable product.
2. Depth: 1-5/8 inches or other as noted on the drawings

I. Hat-Shaped, Rigid Furring Channels: AISI S220, hat-shaped, depth of 7/8 inch or

other as noted on the drawings.

1. Subject to compliance with requirements, provide ClarkDietrich; Hat-Shaped, Rigid Furring Channels, or comparable product.

J. Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet per AISI S220 to form 1/2 inch deep channel of the following configuration:

1. Subject to compliance with requirements, provide ClarkDietrich; Resilient Channel RCSD.
2. Single Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg.

K. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and interlocking cross furring members.

1. Products: Subject to compliance with requirements, provide the following:
   a. Armstrong World Industries, "Furring Systems/Drywall".
   b. Chicago Metallic Corp. "Drywall Furring 640 / Drywall Furring 660".
   c. USG Interiors, Inc. "Drywall Suspension System".

2.03 STEEL FRAMING FOR WALLS AND PARTITIONS

B. Provide steel framing members complying with the following:

1. Protective Coating: AISI S220, G40 (Z120), or equivalent corrosion resistance. A40 galvannealed products are not acceptable.
   a. Coating shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

C. Steel Studs and Runners: AISI S220 and ASTM C645, Section 10.

1. Subject to compliance with requirements, provide ClarkDietrich; ProSTUD 25 gauge- equivalent (0.0150 inch) with Smart Edge technology, or comparable product.
2. Depth: As indicated on Drawings

D. Steel Runner Track at Curved Walls/Partitions: Steel sheet runner for non-structural curves, bends, variable radii and arches. Designed to provide higher strength capacity than conventional lighter gauge material by using a work-hardened steel base strip.

1. Subject to compliance with requirements, provide ClarkDietrich; 360TRAK, or comparable product.
2. Size: As indicated on Drawings or as required if not shown.

E. Hat-Shaped Rigid Furring Channels: AISI S220, hat-shaped, depth and minimum thickness of base (uncoated) metal as follows:

1. Subject to compliance with requirements, provide ClarkDietrich; Furring Channel, or comparable product.
2. Depth: 7/8" or as indicated on Drawings.

F. Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet per AISI S220 to form 1/2 inch deep channel of the following configuration.

1. Subject to compliance with requirements, provide ClarkDietrich; Resilient Channel RCSD.
2. Single Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg.

G. Single Long-Leg Runner System: Manufacturer's top runner complying with AISI S220, with 2-inch (50.8 mm) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging or cold rolled channel with clip angles or ClarkDietrich Spazzer® 9200 Bridging and Bracing Bar located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

H. 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.
1. Subject to compliance with requirements, provide ClarkDietrich; MaxTrak Slotted Deflection Track, or a comparable product or field assembled standard top track assembly compliant with movement requirements

I. Firestop Track: Top runner designed to allow partition had to move while maintaining integrity of assembly fire-resistance rating. Thickness not less than indicated for studs, and of width to accommodate depth ofstuds.
1. Subject to compliance with requirements, provide ClarkDietrich; BlazeFrame® (DSL2) Slotted Deflection Track, or a comparable product. OR
2. Field assembled standard top track assembly with appropriate fire protection and UL assembly classification.

J. Z-Shaped Furring Members: Manufacturer's standard Z-shaped furring members with slotted or nonslotted web, with minimum base metal (uncoated) thickness of 0.0179 inch, face flange of 1-1/4 inch, wall attachment flange of 3/4 inch, and of depth required to fit installation thickness indicated.
1. Subject to compliance with requirements, provide ClarkDietrich; Z-Furring Channel or comparable product.

K. Flat Strap and Backing Plate: Sheet for blocking or bracing in length and width as indicated, and with minimum base metal (uncoated) thickness as follows:
1. Thickness: As indicated on Drawings or as required if not shown.
2. Subject to compliance with requirements, provide ClarkDietrich; Danback Fire Treated Wood Backing Plate D16F or Danback Fire Treated Wood Backing Plate D24F.

L. Channel Bridging: 0.0538 inch base metal thickness, with minimum 1/2 inch wide flanges
1. Subject to compliance with requirements, provide ClarkDietrich; Spazzer® 9200 Bridging and Spacing Bar
2. Subject to compliance with requirements, provide ClarkDietrich; EasyClip™ U-Series Clip Angle U543 but not less than 1-1/2 by 1-1/2 inches, 0.0538 inch thick, galvanized steel.

M. Header/Sill System: Preformed, pre-engineered header/sill, minimum 20 gage, galvanized sheet steel for use at openings in metal stud wall systems.
1. Manufacturer: Subject to compliance with requirements, provide products by the following: Brady Construction Innovations, Inc. "Pro X Header" OR ClarkDietrich; ClarkDietrich; RedHeader PRO.

N. Column and Beam Wrap Fastener: SNAP-ON WALLBOARD CLIP as manufactured by Claw International, 5309 Hwy. 75 North, Suite 112 - Sioux City, IA 51108; Telephone: (712) 239- 7200; Fax: (712) 239-1196; website: www.theclaw.net.
1. The Claw: 1 1/2 inch thick x 2 inch wide x 2 3/8 inch (38 x 51 x 60 mm) long, galvanized steel, snap-on clip.

2. Support Angle: 25-gauge (No. 25 MSG) (0.0209-inch (0.531 mm) thick) galvanized steel angle with 1 1/2 inch (38 mm) legs. Length: 1 inch (25.4 mm) shorter than assembly length.
3. Screws: 1 inch (25.4 mm) and 1 5/8 inch (41 mm) self-drilling, self-tapping, Type 'S' steel.
4. Corner Bead: 26-gauge (No. 26 MSG) (0.0179-inch (0.455 mm) thick) galvanized steel angle with 1 1/4 inch (32 mm) legs.
5. Nails: 4d x 1 3/8 inch (35 mm) long.

O. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power and other properties required to fasten steel framing and furring member securely to substrates involved; comply with recommendations of gypsum board manufacturers for applications indicated.

P. (If indicated as required), Breakaway (Meltaway) Fire Wall Anchors: For double wall fire wall construction where IBC Section 706 requires fire walls to allow collapse of construction on either side without collapse of the wall. Anchors attaching the fire wall to CMU, concrete or steel must have the capability of providing structural performance, but "detach" during a fire.
1. All breakaway anchors shall be constructed of rolled zinc alloy 710 and have a melting point of 792 degrees.
2. Approved anchors shall be equal to Heckmann Breakaway Fire Wall Anchors #187, 274,189, 341-B, 394,196.
3. OPTION: ClarkDietrich aluminum breakaway clips, Aluminum Burn Clip (AB), are used as part of the H-Stud Area Separation Wall assembly, holds the Area Separation Wall assembly in place at the floor roof and truss line between adjacent units, and are designed to melt and break away when exposed to fire.

2.04 WALL BOARD MATERIALS

A. Manufacturers:
1. G-P Gypsum Corporation: www.gp.com.
2. National Gypsum Company: www.nationalgypsum.com.
3. USG Corporation: www.usg.com.
4. Substitutions: See Section 01 2500 Substitution Procedures for substitution procedures.

Q. **General**: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.
1. Thickness: Provide gypsum board in thickness indicated, or if not otherwise indicated, in 5/8 inch thickness.
2. Provide Abuse-Resistant Gypsum Wallboard at ALL corridor, lobby or other "public" locations with gypsum board partitions below 8'-0" A.F.F., minimum.

R. **Gypsum Board**: USG 5/8" thick "Fire Code" Core Gypsum Panel, Type X (ASTM C 1396), SW, with U.L. rating and tapered edges. Provide panels 48" wide and in lengths as long as practical to minimize the number of joints. Metal stud partitions in all areas not mentioned below shall receive Gypsum Board. Provide Sag-resistant type for ceiling surfaces.

S. **Gypsum Backing Board for Multi-Layer Applications**: ASTM C 1396 or, where backing board is not available from manufacturer, gypsum wallboard, ASTM C 1396, of type, edge configuration and thickness indicated below, in maximum lengths available to minimize end- to-end joints. Type X for fire-resistant rated assemblies and

where indicated. Sag-resistant type for ceiling surfaces. Edges: Square, non-tapered, or V-tongue and groove. Thickness: 1/2" and 5/8", unless otherwise indicated.

T. **Abuse-Resistant Gypsum Wallboard**: ASTM C 1278/C 1278M and ASTM C 1396, of types, edge configuration and thickness indicated below without paper facing and with fiber mesh reinforced backing; in maximum lengths available to minimize end-to-end butt joints. Types: Regular, unless otherwise indicated. Thickness: 5/8", unless otherwise indicated.
   1. Manufacturer: Subject to compliance with requirements, provide products by the the following: USG "Fiberock VHI Abuse-Resistant Gypsum Fiber Interior Panels" or USG "Mold Tough AR Firecode Core"
   2. Refer to drawings for locations.

U. **Tile Backer Board in ALL WET AREAS**: Dens-Shield Tile Backer by Georgia Pacific or Fiberock Tile Backer by USG in compliance with ASTM C-1178 meeting mold-mildew-fungus resistance test ASTM D3273-94 with performance rating of 10. Provide panels 48" wide and in lengths as long as practical to minimize the number of joints. Metal stud partitions in areas where walls are likely to get wet shall receive Tile Backer Board. Metal stud partitions with ceramic tile in areas where walls are likely to get wet shall also receive Tile Backer Board. Examples of rooms or areas requiring Tile Backer Board include, but are not limited to: restrooms, janitor closets (within 4'-0" of mop sink), behind sinks, drinking fountains (min 2'-0" beyond each edge and above rim) showers and any other similar wet area or wet area with ceramic tile.

V. **Tile Backer Board in ALL NON-WET AREAS**: Moisture and Mold Resistant Gypsum Board: USG 5/8" Mold Tough "Fire Code" Core Gypsum Panel, Type X (ASTM C1396), SW, with UL rating. Provide panels 48" wide and in lengths as long as practical to minimize the number of joints. Metal stud partitions receiving ceramic tiles in areas where walls are not likely to get wet shall receive Moisture and Mold Resistant Gypsum Board. Examples of rooms or areas requiring Moisture and Mold Resistant Gypsum Board behind ceramic tile include, but are not limited to: corridors with ceramic tile finish.

W. **Gypsum Sheathing (Exterior wall sheathing)**: Fiberglass-Faced "Greenglass", 5/8", Type X (ASTM E119) as manufactured by Temple-Inland, "Dens-Glass Gold" glass mat gypsum sheathing board, 5/8" (ASTM C1177) or Securock Glass-Mat Sheathing as manufactured by
U.S. Gypsum.

F. Partition Head to Structure Connections: Partition Head To Structure Connections: Provide track fastened to structure with legs of minimum 3 inch length to accommodate for minimum 1 inch deflection for friction fit of studs cut short.

G. Between stud wall blocking: Type and size appropriate to stud spacing.

2.05 PARTITION CLOSURES

B. Provide extruded aluminum adjustable partition closures at all junctures of partitions with other construction as indicated.

C. Adjustable partition closures shall be spring loaded assemblies filled with acoustical batt insulation and with finish to match curtain wall system.

D. Manufacturers: Subject to compliance with requirements, provide the following: Gordon Inc., "Mullion Mate".

2.06 PARTITION END CAPS

B. Provide extruded aluminum partition end caps at all partition termination ends.

C. Provide at locations of all adjustable partition closures and other locations indicated. Finish to match curtain wall system.

D. Manufacturers: Subject to compliance with requirements, provide the following: Gordon Inc., "Series 910 Special Shapes".

2.07 TRIM ACCESSORIES

B. Provide manufacturer's standard trim accessories for gypsum board work, per ASTM C 1047. Provide with either knurled or perforated expanded flanges for nailing or stapling, and beaded for concealment of flanges, in joint compound.

C. Interior Trim Accessories: Provide corner beads, L-type edge trim-beads, U-type edge trim• beads, special L-kerf-type edge trim-beads, and one-piece control joint beads complying with the following requirements.

1. Materials: Formed metal complying with the following requirements.
   a. Sheet steel zinc coated by the hot dip process.
   b. Sheet steel zinc coated by the hot dip process or electrolytic process, or sheet steel coated with aluminum.
2. Shapes: As indicated below by reference to Figure 1 designations per ASTM C 1047.
   a. Corner bead on outside corners, unless otherwise indicated.
      1) Product: ClarkDietrich; 103 Deluxe Cornerbead or comparable product.
   b. L-bead with both face and back flanges; face flange formed to receive joint compound. Use L-beads for edge trim, unless otherwise indicated.
      1) Product: ClarkDietrich; Metal U-Trim M20A or comparable product.
   c. L-bead with face flange only; face flange formed to receive joint compound.
      1) Product: ClarkDietrich; Metal L-Trim M20B or comparable product.
   d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
      1) Product: ClarkDietrich; Metal J-Trim M400 Series or comparable product.
   e. One piece control joint formed with V-shaped slot and removable strip covering slot opening.
      1) Product: ClarkDietrich; #093 Control Joint or comparable product.
3. Reveals: Extruded aluminum.
   a. Products: Fry Reglet Corporation "No. DRM-50-625".

D. BOTTOM OF DRYWALL PARTITIONS:

1. Drywall Moisture Protection Devices for bottom of drywall partitions
   PVC Water Protection Device installed at floor level of drywall partitions as manufactured by Waterguard-USA.
   www.Waterguard-USA.com or
   www.KeepsDrywallDry.com Phone number: (800-653-8785)

2. Sizes available:
   a. Non-Rated Walls: Height = 1/2” tall extruded PVC GDW moisture guard: installed continuously at floor level of all GDW throughout building.
   b. 1-Hour Fire Rated Walls: 1/2" tall extruded PVC GDW moisture guard: installed continuously at floor level of all 1-Hour Fire Rated walls.
   c. 2-Hour Fire Rated Walls: 1/2" tall extruded PVC GDW moisture guard: installed continuously at floor level of each layer of GDW on all 2-Hour Fire Rated walls. Once the wall assembly is constructed, place a bead of caulk (latex, acrylic, silicone, polymer, or similar materials-not necessarily listed "fire caulk") at floor level against the outer most layer of moisture guard.

E. Exterior Surface Trim and Accessories: Cornerbead, edge trim, control joints formed from sheet steel zinc coated by the hot dip process per ASTM C 1047, in shapes indicated below by reference to ASTM C 1047, Figure 1 Designations.
1. Cornerbead on outside corners, unless otherwise indicated.
   a. Product: ClarkDietrich; 103 Deluxe Cornerbead or comparable product.
2. Edge trim complying with shape LC-bead per Figure 1, unless otherwise indicated.
   a. Product: ClarkDietrich; Metal U-Trim M20A or comparable product.
3. One piece control joint formed with V-shaped slot and removable strip covering slot opening.
   a. Product: ClarkDietrich; #093 Control Joint or comparable product.

F. Exterior Surface Trim and Accessories: Cornerbead, edge trim, control joints formed from PVC conforming to ASTM D 1784.
1. Shapes: As indicated below by reference to Figure 1 designations per ASTM C 1047.
   a. Cornerbead on outside corners, unless otherwise indicated.
      1) Product: ClarkDietrich; Vinyl Corner Bead or comparable product.
   b. Edge trim complying with shape LC-bead per Figure 1, unless otherwise indicated.
      1) Product: ClarkDietrich; Vinyl "J" Beads or comparable product.
   c. One piece control joint formed with V-shaped slot and removable strip covering slot opening.
      1) Product: ClarkDietrich; Vinyl 093 Control Joint or comparable product.
2. Manufacturers:
   a. Alabama Metal industries Corp. (AMICO).
   b. Plastic Components, Inc.
   c. ClarkDietrich.

G. Soffit Reveals: Prefabricated, extruded aluminum reveals.
1. Manufacturer: Subject to compliance with requirements, provide the following: Fry Reglet Corp. "No. DRM-635-50".

H. Soffit Vents: Prefabricated, extruded aluminum soffit vent, with clear anodized finish.
1. Manufacturer: Subject to compliance with requirements, provide the following: Fry Reglet Corp. "Soffit Vent No. DCS-50-V-200".

2.08 JOINT TREATMENT MATERIALS

B. General: ASTM C 475; type recommended by manufacturer of sheet products and

joint treatment materials for application indicated, unless indicated otherwise.

C. Joint Tape: Paper reinforcing tape.
   1. Interior Gypsum Board: Paper reinforcing tape.
      a. Product: ClarkDietrich; Strait-Flex Butt-Tape, or comparable product.
   2. Exterior Gypsum Board: Paper reinforcing tape.
      a. Product: ClarkDietrich; Strait-Flex Butt-Tape, or comparable product.
   3. Mold and Mildew Resistant Backer Board: Glass mesh tape.

D. Setting Type Joint Compound: Factory prepackaged, job mixed chemical-hardening powder products for bedding and filling, formulated for uses indicated.
   1. For taping and filling only.
   2. For prefilling gypsum board joints.
   3. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile.
   4. For filling joints and treating fasteners of mold and mildew resistant backing board behind base for ceramic tile.
   5. For filling joints and treating fasteners of gypsum base for veneer plaster.
   6. For topping compound, use sandable formulation.

E. Drying-Type Joint Compounds: Factory prepackaged vinyl-based products complying with the following requirements for formulation and intended use.
   1. Ready-Mix Formulation: Factory-mixed product.
   2. All-purpose compound formulated for use as both taping and topping compound (use for finish (third) coat only.)

F. Exterior Joint Compound: Special chemical-hardening-type for exterior application.

2.09 ACOUSTICAL SEALANT

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements.
   1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.

C. Products: Subject compliance with requirements, provide products by the following:
   1. Acoustical Sealant for Exposed and Concealed Joints:
      a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
      b. Tremco Acoustical Sealant; Tremco, Inc.
      c. Sheetrock Acoustical Sealant; United States Gypsum Corp.

2.010 MISCELLANEOUS MATERIALS

B. General: Provide auxiliary materials for gypsum board work of type and grade recommended by gypsum board manufacturer.

C. Laminating Adhesive: Special adhesive or joint compound specifically recommended for laminating gypsum boards.

D. Spot Grout: ASTM C 475, setting-type joint compound for type recommended for spot grouting hollow metal door frames.

E. Gypsum Board Screws: ASTM C 1513
   1. Fastening gypsum board to steel members less than 0.033 inch thick.
   2. Fastening gypsum board to gypsum board.

F. Steel Drill Screws: ASTM C 1513, for fastening gypsum board to steel members.

G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), unfaced mineral fiber blanket insulation in thicknesses shown.
   1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

H. Thermal Insulation: Material indicated below, of thickness and width to fill voids formed by Z• furring members:
   1. Unfaced Mineral Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing), in thicknesses shown. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.
   2. Extruded Polystyrene Board Insulation: ASTM C 578, Type IV, rigid, cellular, polystyrene thermal insulation formed from polystyrene resin using an extrusion process.

I. Isolation Strip at Exterior Walls:
   1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), non• perforated.
   2. Foam Gasket: Adhesive backed, closed cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

J. Access Doors: If not specified elsewhere, Inryco/Milcor Style DW, size 14" x 14" in walls and 22" x 22" in ceilings. Baked enamel prime coat. Contractor to finish paint (spec. section 09 90 00). Concealed spring hinges. Flush, screwdriver operated steel cam lock. Door shall be manufactured with drywall bead attached.

PART 3 - EXECUTION

3.01 GENERAL / EXAMINATION

A. Examine substrates to which gypsum board construction attaches or abuts, installed hollow metal frames, cast-in anchors and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of gypsum board assemblies specified in this Section.

B. Interior gypsum wallboard and ceiling board installation may not commence until all exterior dampproofing and roofing are completed and roof top equipment is fully installed and flashed and exterior wall openings are protected.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

D. Protect gypsum products from moisture and contaminants. Do not store near materials that may offgas harmful voes.

E. Protect workers, building occupants, and HVAC systems from gypsum dust to maintain construction Indoor Air Quality Management Plan.

3.02 INSTALLATION OF STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Comply with ASTM C 754.

B. Install supplementary framing, blocking and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, door bumpers, furnishings and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer, or if none available, with "Gypsum

Construction Handbook", published by United States Gypsum Co.

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details shown on drawings.
   1. Where suspended ceiling assemblies abut building structure horizontally at ceiling perimeters or penetrations of ceiling.
   2. Where partition and wall framing abut overhead structure.
      a. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.

D. Do not bridge building expansion and control joints with steel framing or furring members, independently frame both sides of joints with framing or furring members or as indicated.

3.03 INSTALLATION OF STEEL FRAMING FOR CEILINGS AND SOFFITS

A. Suspend ceiling hangers from building structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum not part of supporting structural or ceiling suspension system.
      a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying or other equally effective means.
   2. Where widths of ducts and other construction within ceiling plenum produce hanger spacings that interfere with the location of hangers at spacing required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
   3. Secure wire hangers to structure, by looping or wire tying, directly to supporting structure, including intermediate framing members. Attach to inserts, eye screws, or other devices appropriate for structure to which hangers are attached as well as for type of hanger involved, in manner that will not cause deterioration or failure, due to age, corrosion or elevated temperatures.
   4. Do not attach hangers to metal roof deck or metal deck tabs.
   5. Do not connect or suspend steel framing from ducts, pipes or conduits.

B. Keep hangers and braces 2 inches clear of ducts, pipes and conduits.

C. Sway-brace suspended steel framing with hangers used for support.

D. Install suspended steel framing components in sizes and at spacing indicated, but not less than required by referenced steel framing installation standard.
   1. Wire Hangers: 0.1620 inch diameter (8 gage), 4 fl. o.c.
   2. Carrying Channels (Main Runners): 1-1/2 inch, 4 fl. o.c.
   3. Rigid Furring Channels (Furring Members): 16 inches o.c.

E. Installation Tolerances: Install steel framing components for suspended ceilings so cross furring members are level to within 1/8 inch in 12 fl. as measured both lengthwise in each member and transversely between parallel members.

F. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

G. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension system abuts vertical surfaces. Mechanically join main beam and cross furring members to each other and butt cut to fit wall track.

H. For exterior soffits, install cross-bracing and additional framing to resist wind uplift.

3.04 INSTALLATION OF STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings and structural walls and columns where gypsum board stud system abuts other construction.
   1. Use proprietary tracks for non-rated and fire rated walls and partitions.
   2. Install studs full height for all partitions unless noted otherwise.
   3. Where studs are installed directly against exterior walls, install asphalt felUfoam isolation strips between studs and wall.

B. Installation Tolerances: Install each steel framing and furring member so that fastening surface does not vary more than 1/8 inch from plane of faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at or just above suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
   1. Cut studs 1/2 inch short of full height to provide perimeter relief.
   2. For STC-rated or fire-resistance rated partitions that extend full height, install framing around structural members, as required to support gypsum board closures needed to make partitions continuous from floor to underside of structure above.
   3. Install bridging/spacing bar.

D. Brace partition framing, not extending full height to structure above, with studs same size and thickness as partition framing. Provide bracing at:
   1. 6'-0" o.c. intervals along length of partitions.
   2. Not less than 6'-0" from partition ends and corners.
   3. Door and window openings.

E. Terminate partition framing at suspended ceilings where indicated.

F. Install steel studs and furring in sizes and at spacings indicated.
   1. Single-Layer Construction: Space studs 16 inches o.c., unless otherwise indicated.
   2. Multiple-Layer Construction: Space studs 16 inches o.c., unless otherwise indicated.

G. Install steel studs with flanges in same direction and leading edge or end of gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

H. Frame door openings to comply with details indicated, with GA-219 and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   1. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

I. Frame openings other than door openings to comply with details indicated, or if none indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.

J. Install thermal insulation vertically and hold in place with Z-furring members spaced at 24 inches o.c.
   1. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails or screws designed for masonry attachment, spaced at 24 inches o.c.
   2. At exterior corners attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation and continue in regular manner.
   3. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

3.05 APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Comply with ASTM C 840 and GA-216.

B. Install sound attenuation insulation blankets where indicated, prior to gypsum board, unless readily installed after board has been installed on one side.

C. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches in alternate courses of board.

D. Install ceiling boards across framing in manner to minimize end-butt joints, and avoids end joints in central area of each ceiling. Stagger end joints at least 24 inches.

E. Install wall/partition boards in manner to minimize end-butt joints or avoids them entirely where possible. At high walls, install boards horizontally with end joints staggered over studs.

F. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

G. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints.
   1. Position boards so like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends.
   2. Do not place tapered edges against cut edges or ends.
   3. Stagger vertical joints over different studs on opposite sides of partitions.

H. Attach gypsum board to steel studs so leading edge or end of each board is attached to open (unsupported) edge of stud flange first.

I. Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

J. Spot grout hollow metal door frames for solid core wood doors, hollow metal doors and doors over 32 inches wide except where full grout shown. Apply spot grout at each jamb anchor clip just before inserting board into frame.

K. Form control joints and expansion joints at locations indicated or as recommended, with space between edges of boards, prepared to receive trim accessories.

L. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceiling, etc.), except in chase walls which are braced internally.
   1. Except where 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. fl. area, and may be limited to not less than 75 percent of full coverage.
   2. Fit gypsum board around ducts, pipes and conduits.

M. Isolate perimeters of non-load-bearing drywall partitions at structural abutments. Provide 1/4 to 1/2 inch space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant unless fire resistant sealant shown.

N. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and other penetrations with a continuous bead of acoustical sealant. Include a bead of sealant at both faces of partitions.
   1. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound flanking paths around or through gypsum board assemblies, including partitions extending above ceilings.

O. Space fasteners in gypsum board in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

P. Space fasteners in panels that are tile substrates maximum 8 inches o.c.

3.06 METHODS OF GYPSUM BOARD APPLICATION

A. Single-Layer Application: Install gypsum wallboard as follows:
   1. On ceilings apply gypsum board prior to wall/partition board application to greatest extent possible.
   2. On partitions/walls apply gypsum board vertically (parallel to framing), unless otherwise indicated or required by fire resistance rated assembly, and provide sheet lengths which will minimize end joints.
      a. On partitions/walls 8'-1" or less in height, apply gypsum board horizontally (perpendicular to framing); use maximum length sheets possible to minimize end joints.
      b. At stairwells and other high walls, install gypsum board horizontal, unless otherwise indicated or required for fire resistance rating.
      c. On Z-furring, apply gypsum panels vertically (parallel to framing). Locate edge joints over furring member.

B. Double-Layer Application: Install gypsum backing board for base layer and exposed gypsum board for face layer.
   1. On ceilings apply base layer prior to application of base layer on walls/partitions; apply face layers in same sequence. Offset joints between layers minimum one stud space. Apply base layers at right angles to supports, unless otherwise indicated.
   2. On partitions/walls apply base layer and face layers vertically (parallel to framing) with joints of base layer over supports and face layer joints offset minimum one stud space with base layer joints.

C. Wall Tile Substrates: For substrates scheduled to receive ceramic tile, comply with the following:
   1. Install glass-mat, water-resistant gypsum backing board panels to comply with

manufacturer's installation instructions at locations scheduled to receive wall tile. Install with 1/4-inch open space where panels abut other construction.

D. Single-Layer Fastening Methods: Apply gypsum boards to metal supports with screws and to wood supports with nails.

E. Double-Layer Fastening Methods: Apply base layer of gypsum board and face layer to base layer as follows:
   1. Fasten base layer with screws and face layer with adhesive and supplementary fasteners, except where otherwise required for fire-resistance rated assemblies.

3.07 INSTALLATION OF DRYWALL TRIM ACCESSORIES

A. General: Where feasible, use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

B. Install corner beads at external corners, except for walls to receive corner guards.

C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi- exposed. Provide type with face flange to receive joint compound except where "U" bead (semi-finishing type) is indicated.
   1. Install "LC" bead where drywall construction is tightly butted to other construction and back flange can be attached to framing or supporting substrate.
   2. Install "LK" bead where substrate is kerfed to receive long flange of trim.
   3. Install "L" bead where edge trim can only be installed after gypsum board is installed.
   4. Install U-type trim where edge is exposed, gasketed or sealant-filled (including expansion joints).

D. Install control joints at locations indicated, or if not indicated, at spacings not greater than 20'- 0" centers and locations required by ASTM C 840 and manufacturer's recommendations; and approved by Architect for visual effect.

E. Install reveals at locations indicated on Drawings, whether specifically called out or not. Lines on drawings that are in-plane with the wall shall be considered reveals for bidding purposes and shall be coordinated with Architect prior to beginning wall framing.

F. Install soffit vents at locations indicated.

3.08 FINISHING OF GYPSUM WALL BOARD

A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.

B. Prefill open joints using setting-type joint compound.

C. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.

D. Finish interior gypsum wallboard by applying the following joint compounds in three coats (not including prefill of openings in base), sand between coats, and after last coat.
   1. Embedding and First Coat: Setting-type joint compound.
   2. Fill (Second) Coat: Setting-type joint compound.
   3. Finish (Third) Coat: Ready-mix drying all-purpose or topping compound.
   4. Textured finishes may be achieved by means of roller texture. Contractor to provide mockup of texture area in small, well lit room for Architect's review and approval prior to installation throughout project.

E. Mold and Mildew Resistant Gypsum Board: Finish using setting type joint compounds to prefill joints and embed tape, for first, fill (second), and finish (third) coats, with last coat being a sandable product. Smooth each coat before joint compound hardens to minimize sanding.

F. Water-Resistant Backer Board Base for Ceramic Tile: Finish joints to comply with ASTM C 840, with gypsum board manufacturer's recommendations, and installation standards referenced in Section 09 31 00 - Ceramic and Quarry Tile.

G. Glass-Mat Water Resistant Backer Board: Comply with glass mat backer board manufacturer's recommendations.

H. Partial Finishing: Omit third coat and sanding on concealed drywall construction indicated for drywall finishing or which requires finishing to achieve fire-resistance rating, sound rating or to act as air or smoke barrier.

I. Levels of Finish: Provide in accordance with Gypsum Association GA 214, "Recommended Levels of Gypsum Board Finish".
   1. Level 0 finish: For temporary construction only where gypsum board is scheduled for removal before project completion.
      a. No taping, finishing or accessories required.
   2. Level 1 finish: Ceiling plenum areas and concealed areas not visible to view, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
      a. All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
   3. Level 2 finish: All visible areas not receiving paint finish or unconditioned spaces not receiving other finish.
      a. All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles.
      b. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound.
      c. Tool marks and ridges are acceptable.
      d. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
   3. Level 3 finish: Gypsum board substrate at areas to receive textured finishes before painting or areas to receive wall coverings. Do not use for smooth painted surfaces.
      a. All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all

joints and interior angles.

b. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.

c. The prepared surface shall be coated with a drywall primer prior to the application of final finishes.

4. Level 4 finish: All Gypsum board surfaces, to receive flat, eggshell or satin paint, or light texture finish except where another finish level is indicated.

a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles.

b. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.

c. The prepared surface shall be coated with a drywall primer prior to the application of final finishes.

5. Level 5 finish: All gypsum board surfaces to receive gloss, semi-gloss, or enamel finish or where severe lighting conditions occur. Also to be used on all formed curved drywall surfaces.

a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles.

b. Fastener heads and accessories shall be covered with three separate coats of joint compound.

c. A thin skim coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.

d. The prepared surface be coated with a drywall primer prior to the application of finish paint.

3.09 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in manner suitable to Installer, to ensure gypsum board assemblies are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09 2216
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal partition, ceiling, and soffit framing.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking within stud framing.

B. Section 06 1000 - Rough Carpentry: Wall sheathing.

C. Section 07 9000- Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

D. Section 09 2116 - Gypsum Board Assemblies: Execution requirements for anchors for attaching work of this section.

1.03 REFERENCE STANDARDS

A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.

B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 FRAMING MATERIALS

A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Studs: C shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.

B. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging on both sides.

C. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.

D. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.

E. Fasteners: ASTM C1002 self-piercing tapping screws.

2.02 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that rough-in utilities are in proper location.

3.02 INSTALLATION OF STUD FRAMING

A. Extend partition framing to structure where indicated and to ceiling in other locations.

B. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

C. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs as indicated.

D. Align and secure top and bottom runners at 24 inches on center.

E. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

F. Install studs vertically at spacing indicated on drawings.

G. Align stud web openings horizontally.

H. Secure studs to tracks using crimping method. Do not weld.

I. Stud splicing is not permissible.

J. Fabricate corners using a minimum of three studs.

K. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

L. Brace stud framing system rigid.

M. Coordinate erection of studs with requirements of door frames; install supports and attachments.

N. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

3.03 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.04 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 3000

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Transition strips.

E. Ceramic trim.

1.02 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, control and expansion joints, and thresholds.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.05 FIELD CONDITIONS

A. Do not install adhesives in an unventilated environment.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers:
   1. Daltile; www.daltile.com
   2. Crossville Cermamics; www.crossvilleinc.com.
   3. Interceramic; www.interceramic.com
   4. Arizonatile: www.arizonatile.com
   5. Tilebar: www.tilebar.com
   6. Substitutions: Under provisions of Section 01 2500.

B. Ceramic Tile:
   1. Colors, sizes and textures as designated on the Finish Schedule.

C. Porcelain Tile:
   1. Colors, sizes and textures as designated on the Finish Schedule.

2.02 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
   1. Applications: Use in the following locations:
      a. Open Edges: Bullnose.

b. Inside Corners: Jointed.
c. Floor to Wall Joints: Cove base.

2. Manufacturer: Same as for tile.

B. Thresholds: Class A white marble, honed finish, beveled both sides, radiused from bevels to vertical planes, one piece for full width of door or opening.

2.03 ADHESIVE MATERIALS

A. Manufacturers:
1. Bonsal American, Inc; StayFlex 590: www.prospec.com
2. Bostik Inc: www.bostik-us.com.
3. Mapei Corporation: www.mapei.com.
4. Substitutions: See Section 01 2500 - Substitution Procedures.

B. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.

2.04 GROUT MATERIALS

A. Manufacturers:
1. Bonsal American, Inc: www.prospec.com
2. Bostik Inc: www.bostik-us.com.
3. Custom Building Products: www.custombuildingproducts.com.

B. Standard Grout: Any type specified in ANSI A118.6 or A118.7.
1. Colors: To be selected by Architect from manufacturer's standard range.

2.05 MORTAR BED MATERIALS

A. Pre-packaged mix of Portland cement, sand, latex additive, and water.
1. Products:
a. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed: www.laticrete.com/#sle.
b. Merkrete, by Parex USA, Inc; Merkrete Underlay C: www.merkrete.com/sle.
c. Proflex Products, Inc; MSI - Mud Set Installation: www.proflex.us.
d. Substitutions: See Section 01 2500 - Substitution Procedures.

2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
1. Type: Fluid-applied.
2. Thickness: 20 mils, maximum.
3. Crack Resistance: No failure at 1/16 inch gap, minimum.
4. Products:
a. LATICRETE International, Inc; LATICRETE Blue 92 Anti-Fracture Membrane: www.laticrete.com/#sle.
b. Merkrete, by Parex USA, Inc; Merkrete Fracture Guard: www.merkrete.com/sle.
c. Substitutions: See Section 01 2500 - Substitution Procedures.

B. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

C. Cleavage Membrane Under Thick Mortar Bed:
1. Material: 4 mil thick polyethylene film.

D. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Fluid or Trowel Applied Type:
a. Material: Synthetic rubber.

b. Thickness: 25 mils, minimum, dry film thickness.

c. Products:
   1) Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com.
   2) LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com/#sle.
   3) Merkrete, by Parex USA, Inc; Merkrete Hydro Guard 2000: www.merkrete.com/sle.
   4) Substitutions: See Section 01 2500 - Substitution Procedures.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor 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 sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

3.02 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 cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.

E. Install tile backer board in strict accordance with manufacturer's instructions, using galvanized roofing nails or corrosion-resistant bugle head drywall screws. Bed fiberglass self-adhesive tape at all joints and corners with material used to set tiles.

F. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook 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 joints watertight, without voids, cracks, excess mortar, or excess grout.

E. Form internal angles square and external angles bullnosed.

F. Install thresholds where indicated.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

I. Allow tile to set for a minimum of 48 hours prior to grouting.

J. Grout tile joints. Use standard grout unless otherwise indicated.

K. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - MORTAR BED METHODS (QUARRY TILE)

A. Over exterior concrete substrates, install in accordance with TCNA (HB) Method F101, bonded, with standard grout.

B. Over interior concrete substrates, install in accordance with TCNA (HB) Method F111, with cleavage membrane, unless otherwise indicated.
   1. Where waterproofing membrane is indicated, with standard grout or no mention of grout type, install in accordance with TCNA (HB) Method F121.
   2. Where epoxy or furan grout is indicated, but not epoxy or furan bond coat, install in accordance with TCNA (HB) Method F114, with cleavage membrane.

C. Cleavage Membrane: Lap edges and ends.

D. Waterproofing Membrane: Install as recommended by manufacturer and as specified in the section in which the product is specified.

E. Mortar Bed Thickness: 5/8 inch, unless otherwise indicated.

3.05 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.

3.06 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCA Handbook Method W244, using membrane at toilet rooms.

B. Over gypsum wallboard on wood or metal studs install in accordance with TCA Handbook Method W243, thin-set with dry-set or latex-portland cement bond coat, unless otherwise indicated.

C. Over interior concrete and masonry install in accordance with TCA Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat.

3.06 CLEANING

A. Clean tile and grout surfaces.

3.07 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 5100

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 REFERENCE STANDARDS

A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2009b.

B. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 2008.

C. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTAL PROCEDURES

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.

1.04 SUBMITTALS

A. Product Data: Provide data on suspension system components.

B. Manufacturer's Installation Instructions: Indicate special procedures.

1.05 QUALITY ASSURANCE

A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL for the fire resistance indicated.

1.06 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.07 MAINTENACE MATERIALS

A. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Ceiling tile: Quantity equal to 15 percent of total installed of each type installed.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Drawings and specifications are based on manufacturer's literature from Armstrong World Industries, Inc. unless otherwise indicated. Other manufacturers to comply with the minimum levels of material and detailing indicated on the drawings and in the specifications and in conformance with provisions of Section 01 2500 – Substitution Procedures.

B. Other Acceptable Manufacturers:

1. Certain Teed Corporation: www.certainteed.com.
2. Hunter Douglas Contract: www.hunterdouglascontract.com.
3. Substitutions permitted in accordance with provisions of Section 01 2500.

C. Acoustical Units

1. Acoustical Tile:
   a. 24 x 24 panel.
   b. Square edge.
   c. Color: Flat white.

d. Texture: Fine fissured.
e. Thickness: ¾".

2. Units for Installation in Fire-Rated Suspension System: Listed and classified for the resistive assembly the suspension system is a part of.

2.02 SUSPENSION SYSTEM

A. Acceptable Manufacturers:
1. Provide suspension system from the same manufacturer as for acoustical units.
2. Substitutions: Not permitted.

B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
1. Match existing systems for repair or replacement.

2.03 FORMATIONS CURVES CLOUD KITS

A. Acceptable Manufacturer:
a. Armstrong Ceilings Formations Curves Cloud Kits
b. Panel: Ultima Vector Factory-cut Curved Panels
c. Trim Types: 4" AXIOM VECTOR Trim
d. Cloud Size: as noted on drawings
e. Material: Mineral Fiber with Acoustic performance
f. Color: Manufacturer Axiom Trim Colors

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install new suspension system or components where existing is damaged or otherwise unusable.

B. Install suspension system in accordance with manufacturer's instructions and as supplemented in this section.

C. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

D. Locate system according to reflected plan shown on the drawings.

E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

F. 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. 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.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
1. Use longest practical lengths.
2. Miter corners.

L. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with

fire rated assembly requirements and light fixture ventilation requirements.

3.03 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. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

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. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

I. Install hold-down clips on panels within 20 ft of an exterior door.

3.04 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

SECTION 09 51 13

ACOUSTICAL CEILINGS – KITCHEN ZONE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes

1. Acoustical ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

B. ALTERNATES

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been pre-approved by the architect and included in the Addenda, the originally specified products shall be provided without additional compensation.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers; Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
11. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
12. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code
C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality
D. NFPA 70 National Electrical Code
E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
G. International Code Council-Evaluation Services Report - Seismic Engineer Report
    1. ESR 1308 - Armstrong Suspension Systems
H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report
    1. 0244 - Armstrong Single Span Suspension System
I. California Department of Public Health CDPH/EHLB/Standard Method v1.2 2017
J. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings
K. International Well Building Standard
L. Mindful Materials
M. Living Building Challenge
N. U.S. Department of Agriculture BioPreferred program (USDA BioPreferred).
O. Clean Rooms up to ISO Class 5 (Class 100)

1.4 SYSTEM DESCRIPTION

A. Continuous/Wall-to-wall

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.

D. Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification, such as Underwriter’s Laboratory (UL), of NRC, CAC, and AC.

   1. If the material supplied by the acoustical subcontractor does not have an independent laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer to ensure fit and function.

B. Installer Qualifications: Company specializing in performing specified work type, a minimum of three years of documented experience, and approved by the manufacturer.

C. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

D. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 Classification.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.8 PROJECT CONDITIONS

A. Space Enclosure:
    1. HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless-steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

1.9 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
    1. Acoustical Panels with HumiGuard® Max and HumiGuard® Plus performance: sagging and warping
    2. Acoustical panels with BioBlock® performance: growth of mold and mildew
    3. Grid System: rusting and manufacturer's defects
B. Warranty Period:
    1. Ceiling System: Thirty (30) years from date of substantial completion
C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.10 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
    1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 15 percent of amount installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:
   1. Armstrong World Industries, Inc.

B. Suspension Systems:
   1. Armstrong World Industries, Inc.

2.2 ACOUSTICAL CEILING UNITS

A. Acoustical Panel Ceilings
   1. Surface Texture: Smooth Texture
   2. Composition: Mineral Fiber
   3. Color: White
   4. Size: 24 in x 24 in, 24 in x 48 in
   5. Edge Profile: Square Lay-in
   6. Ceiling Attenuation Class (CAC): ASTM E1414/E1414M; Classified with UL label on product carton: 33
   7. Flame Spread: ASTM E 1264; Class A
   8. Light Reflectance (LR) White Panel: ASTM E 1477; 0.89
   9. Dimensional Stability: HumiGuard Plus
   10. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
   11. Indoor Air Quality Certified to SCS-105 v4.2-2023
   12. Basis of Design: **KITCHEN ZONE** as manufactured by Armstrong World Industries, Inc.
   13. Substitutions: Refer to Alternates in Part 1.

2.3 METAL SUSPENSION SYSTEMS

A. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
   1. Structural Classification: ASTM C 635 Intermediate or Heavy Duty.
   2. Color: White or match the actual color of the selected ceiling tile, unless noted otherwise.
   3. Sustainability: Environmental Product Declaration (EPD), Health Product Declaration (HPD)
   4. Basis of Design:

i. Prelude XL 15/16” Exposed Tee as manufactured by Armstrong World Industries, Inc.

5. Substitutions: Refer to Alternates in Part 1.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings as manufactured by Armstrong World Industries, Inc.

E. AXIOM Trim & Transitions as manufactured by Armstrong World Industries, Inc. www.armstrongceilings.com/axiom

F. Accessories as manufactured by Armstrong World Industries, Inc.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Follow manufacturer installation instructions.

B. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

C. Suspend main beam from overhead construction with hanger wires spaced 4 feet on center along the length of the main runner. Install hanger wires plumb and straight.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.02 REFERENCES

A. ASTM F 1066 - Standard Specification for Vinyl Composition Floor Tile; current edition.

B. ASTM F 1861 - Standard Specification for Resilient Wall Base; current edition.

1.03 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Firm with a minimum of five years successful experience completing resilient tile installation similar to that required.

B. Pre-installation Conference: Conduct meeting at site prior to commencing work related to resilient tile installation.

1. Require attendance of parties directly affecting resilient tile installation.

2. Review site conditions, procedures, and coordination required with related work.

C. Field Mockup: Provide mock-up of each type of installation using approved materials and specified methods of installation. Obtain Architect's acceptance of mockup prior to start of resilient tile installation.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

B. 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.

1.06 EXTRA MATERIALS

A. See Section 01 2500 - Substitution Procedures, for additional provisions.

B. Provide 100 sq ft of flooring, 100 lineal feet of base of each type and color specified.

PART 2 PRODUCTS

2.01 MATERIALS - TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
   1. Manufacturers:
      a. Armstrong Flooring; Standard Excelon Imperial Texture
      b. Substitutions: See Section 01 2500 Substitution Procedures.
   2. Minimum Requirements: Comply with ASTM F 1066, of Class corresponding to type specified.
   3. Size: 12 by 12 inch.
   4. Thickness: 0.125 inch.
   5. Color and Pattern: As designated in the Finish Schedule on the Drawings..
   6. The above Basis of Design is intended to establish a standard of quality and configuration and is not intended to preclude the use of accepted substitutions: Submit substitutions in accordance with Section 01 2500 - Substitution Procedures.

B. Feature Strips: Of same material as tile.

2.02 MATERIALS – RESILIENT BASE

A. Resilient Base: Type TS rubber, vulcanized thermoset; style as scheduled.
   1. Manufacturers:
      a. Roppe Corporation
      b. Johnsonite, a Tarkett Compony
      c. Mannington Commercial
      d. Substitutions: See Section 01 600 Substitution Procedures.
   2. Height: 4 inches.
   3. Thickness: 0.125 inch.
   4. Finish: Satin.
   5. Length: Roll.
   6. Color: As selected.
   7. Accessories: Premolded internal and external corners.
   8. The above Basis of Design is intended to establish a standard of quality and configuration and is not intended to preclude the use of accepted substitutions. Submit substitutions in accordance with Section 01 2500 - Substitution Procedures.

2.03 TILE ACCESSORIES

A. Edge Strips (Moldings): Homogeneous vinyl, tapered or bullnose edge. Color: As selected by Architect to compliment vinyl composition tile.

B. Subfloor Filler: Hydraulic/Portland cement-based material designed for providing thin solid surface for leveling and for minor ramping of subsurface to adjacent floor finishes. Use material capable of being applied and feathered out to adjacent floor without spoiling.

C. Primers and Adhesives: Water and alkali resistant, zero regulated VOC types as recommended by flooring manufacturer for specific application.
   1. For increased substrate moisture and alkali tolerance, IQ Spray Smart adhesive system (Gold: Max 7 lbs (MVER)& 11 pH Tolerance or Platinum: Max 10 lbs (MVER) & 12 pH Tolerance) may be used only if approved or recommendation by flooring manufacturer.

D. Sealer and Wax: Provide Diversey Floor Finish Vectra, provide (7) coats of wax, install per manufacturer's.

E. Thresholds and Floor Transitions: Provide rubber transition strips, finish and color as selected by Architect from manufacturer colors. Provide at doorways where tile terminates, and at open edges of floor tile where adjacent finish is a different height.

1. Manufacturers:
   a. Roppe Corporation
   b. Mannington Commercial
   d. Substitutions: See Section 01 600 Substitution Procedures

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.

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 resilient base.

C. Verify that sub-floor surfaces are dust-free and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for resilient flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
2. Alkalinity: pH range of 5-9.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.

C. Clean substrate.

D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION – RUBBER, PLANK, AND TILE FLOORING

A. Install in accordance with manufacturer's instructions.

B. Mix tile from container to ensure shade variations are consistent when tile is placed.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Set flooring in place, press with heavy roller to attain full adhesion.

E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

G. Install feature strips and floor markings where indicated. Fit joints tightly.

3.04 INSTALLATION - BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.05 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean, seal, and provide **(7) coats of Diversey Floor Finish Vectra (no substitution)** wax to resilient flooring products in accordance with manufacturer's instructions.

3.06 PROTECTION OF FINISHED WORK

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Protect floors from damage during remainder of construction operations; do not move heavy objects over resilient tile flooring, which could damage flooring.

C. Replace all flooring damaged by subsequent construction operations.

END OF SECTION

SECTION 09 6813

TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.02 RELATED SECTIONS

A. Section 09 6500 - Resilient Flooring: Wall base finish.

1.03 REFERENCES

A. CRI 104 - Standard for Installation of Commercial Textile Floorcovering Materials; Carpet and Rug Institute; current edition.

B. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; www.carpet-rug.org; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate layout of joints, direction of carpet pile, and location of edge moldings.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

E. Submit two, 12 inch long samples of edge strip.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum five years documented experience.

B. Installer Qualifications: Company specializing in installing carpet with minimum three years’experience.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

1.07 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Provide 30 each carpet tiles of each color and pattern selected.

PART 2 PRODUCTS

2.01 MANUFACTURER AND PRODUCT

A. Carpet materials are as called out in the Finish Schedule on the Drawings.

2.02 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Thresholds and Floor Transitions: Provide rubber transition strips, finish and color as selected by Architect from manufacturer colors. Provide at doorways where tile terminates, and at open edges of floor tile where adjacent finish is a different height.

1. Manufacturers:
    a. Roppe Corporation
    b. Mannington Commercial
    d. Substitutions: See Section 01 600 Substitution Procedures

C. Adhesives: Acceptable to carpet manufacturers, compatible with materials being adhered; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet 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 carpet tile.

C. Verify that sub-floor surfaces are dust-free and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for carpet tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

3.03 INSTALLATION

A. Install carpet tile in accordance with manufacturer's instructions and CRI 104.

B. Blend carpet from different cartons to ensure minimal variation in color match.

C. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

D. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

E. Fully adhere carpet tile to substrate.

F. Trim carpet tile neatly at walls and around interruptions.

G. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 72 00

DIGITALLY PRINTED VINYL WALLCOVERING MURALS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide digitally printed wallcovering vinyl wallcovering, complete.

B. Related Sections

1. Section 16500 - Lighting: Permanent during installation.
2. Section 09250 - Gypsum Board: Wall Substrates.
3. Section 09900 - Painting: Preparation and priming of substrate surfaces.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. E 84 Test Method for Surface Burning Characteristics of Building Materials.

B. Wallcovering Association (WA):

1. WA-101-2011 Quality Standard for Polymer Coated Fabric Wallcovering.

C. Federal Specifications (FedSpec):

2. CCC-W- 408A Wallcovering, Vinyl Coated

D. Underwriters Laboratory, Inc. (UL)

1. UL 723: Test for Surface Burning Characteristics of Building Materials

F. National Fire Protection Agency (NFPA)

1. NFPA 101 Life Safety Code
2. NFPA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
3. CAN/ULC-S102 Test for Surface Burning Characteristics of Building Materials and Assemblies

1.03 SUBMITTALS

A. Submit one Color Proof for approval prior to manufacture of a full size miniature mural.

B. Submit one full size miniature strike-off for approval prior to the manufacture of full size mural

C. Submit manufacturers' product data and installation instructions for each digitally printed wallcovering mural, adhesive and accessory required.

1. Include data on physical properties, fire hazard classification and fire detection characteristics of wallcovering.

2. Include manufacturer's recommendations for maximum permissible moisture content of substrates.

D. Submit full-size samples, 54 inches wide by 36 inches long, cut from current production of each ground wallcovering selected to demonstrate quality, weight, color and embossing.

E. Submit manufacturer's written product certification that all furnished wallcovering ground meets or exceeds the specification requirements. Include certified copies of tests specified.

F. Submit wallcovering ground manufacturer's written instructions for recommended maintenance of each type of wallcovering required.

1.04 QUALITY ASSURANCE

A. Manufacturer: Provide each type of digitally printed vinyl wallcovering mural required produced by one manufacturer whose published product literature clearly indicates compliance of wallcovering ground with specified requirements.

B. Applicator: Installation by skilled commercial wallcovering applicators with no less than three years of documented experience installing wallcovering murals of the types and extent specified for the project.

C. Material Standards: Provide materials that meet or exceed Federal Specification CCC-W-408A and WA- 101 Quality Standard for Polymer Coated Fabric Wallcovering for Type I and Type II wallcovering.

D. Physical Properties: Provide wallcovering with the following physical properties when tested in accordance with ASTM D751.

1. Total weight: 21 oz./lin. yd

2. Tensile Strength: 50 X 55 Minimum (W x F)

3. Tear Strength: 25 X 25 Minimum (W x F)

E. Fire Hazard Classification: Provide materials that comply with Class A fire rating when tested in accordance with ASTM E84.

F. Underwriters Laboratories approval: Provide materials that have been tested and approved by Underwriters Laboratories.

G. Smoke Toxicity: Provide materials that have been tested for smoke toxicity and approved for use by New York City Materials and Equipment Acceptance Division (MEA).

H. Fire Detection Characteristics: Provide materials that have been laboratory tested for the Early Warning Effect® in accordance with ASTM E 603. Submit test results certifying that when one square foot section of the material is heated to 300 degrees F, the wallcovering emits an odorless, colorless non-toxic vapor that will activate an ionization smoke detector.

I. Low Emissions: Provide materials that meet the requirements of California Integrated Waste Management Board’s Special Environmental Requirements Specification CA 01350 for low emitting materials.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver digitally printed vinyl wallcovering mural to the project site in unbroken and undamaged wrappings and clearly labeled with the manufacturer's identification label, quality or grade, UL label and sidemark.

B. Store materials in a clean, dry storage area with temperature maintained above 55 degrees with normal humidity.

C. Store material in a flat position to prevent damage to roll-ends. Do not cross stack material. Support material off the floor in a manner to prevent sagging and warping.

1.06 PROJECT CONDITIONS

A. Do not apply digitally printed wallcovering mural when surface and ambient temperatures are outside the temperature ranges required by the wallcovering manufacturer.

B. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 60 degrees F unless required otherwise by manufacturer's instructions.

C. Apply adhesive only when substrate surface temperature or ambient temperature is above 60 degrees F, or relative humidity is below 40 percent.

D. Maintain constant recommended temperature and humidity for at least 72 hours prior to, throughout the installation period and for 72 hours after wallcovering installation completion.

E. Provide not less than an 80 foot candles per square foot lighting level minimum measured mid height at substrate surfaces.

1.07 WARRANTY

A. Submit manufacturer’s 5 year written warranty against manufacturing defects.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Digitally Printed Wallcovering Mural: **Koroseal** Digitally Printed Wallcovering Murals manufactured by Koroseal Interior Products, LLC.

2.02 MATERIALS

A. Wallcovering: Koroseal Digital Surfaces Wallcovering, Pattern: Dewdrop Inn – Mist, KDE-DDN-01 Type II conforming to Federal Specification CCC-W-408A and WA-101-A using test methods given in Federal Specification CCC-T-191 b excepted as otherwise specified.

1.	Total Weight:	21 ounces per linear yard.
2.	Backing Weight:	3.1 ounces per linear yard.
3.	Vinyl Weight:	17.9 ounces per linear yard
4.	Thickness:	0.018 to 0.026 inches
5.	Fabric backing and content:	Poly-Cotton Woven

B. Digital Image: Owner/Architect to provide PDF file of image to be digitally printed with UV inks on Koroseal Digital Surfaces Type II Wallcovering

2.03 ACCESSORIES

A. Adhesives: Koroseal A-848-B Heavy-Duty Premixed vinyl adhesive.

B. Substrate Primer/Sealer: White pigmented alkyd or acrylic/latex base primer specifically formulated for use with vinyl wallcoverings.

C. [Optional] Metal Moldings: Extruded aluminum, alloy 6063-T5, long lengths, with fine satin mechanical finish and class 2 clear architectural anodic coating conforming to AA M21A31 designed for use with vinyl wallcoverings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and installation conditions.

C. Test substrates with a suitable moisture meter and verify that moisture content does not exceed 4 percent

D. Verify substrate surfaces are clean, dry, smooth, structurally sound and free from surface defects and imperfections that would show through the finished surface.

E. Evaluate all painted surfaces for the possibility of pigment bleed-through.

F. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation. Beginning of installation means acceptance of surface conditions.

3.02 INSTALLATION

A. Allow digitally printed vinyl wallcovering mural to acclimatize to the area of installation a minimum of 24 hours before installation.

B. Before cutting, examine image and color and determine that they are the correct image and color as specified for the correct location.

C. Read and follow the instructions in the manufacturer's installation sheet contained in each roll of the digitally printed vinyl wallcovering mural.

D. Use adhesive recommended by the wallcovering manufacturer.

E. Install each panel in sequence as indicated on the drawings.

F. If there are variations in color or image that are considered to be excessive, notify the manufacturer's representative for an inspection before any further wallcovering is installed.

G. Smooth wallcovering to the hanging surface using a stiff bristled sweep brush to eliminate air bubbles, wrinkles, gaps and overlaps.

H. Remove excess adhesive along finished seams immediately after each wallcovering strip applied. Use clean warm water, a natural sponge and clean towels. Change water often to maintain water cleanliness.

3.02 CLEAN-UP COMPLETION

A. Upon completion of the work, remove surplus materials, rubbish and debris resulting from the wallcovering installation. Leave areas in neat clean and orderly condition.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

1.02 RELATED SECTIONS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.

B. Mechanical Identification: Painted identification.

C. Electrical Identification: Painted identification.

1.03 REFERENCES

A. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; current edition.

B. ASTM D 4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; current edition.

C. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; current edition.

1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products.

C. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

D. Samples: Provide approval samples 24 inch x 24 inch of required specialty or “faux” finishes for Architect approval.

1.06 MOCK-UPS

A. Provide mockups of all painted or stained surfaces. Mock-up may remain in place following approval of the Architect.

B. Provide adequate lighting for mock up review.

C. Notify Owner and Architect minimum 72 hours prior to mock-up review.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years’ experience.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.09 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.11 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Supply one gallons of each color; store where directed.

C. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paints:
   1. Base Manufacturer: Benjamin Moore & Co: www.benjaminmoore.com.
   2. Other Acceptable Manufacturers:
      a. Duron, Inc: www.duron.com.
      b. ICI Paints North America: www.icidecorativepaints.com.
      c. Sherwin Williams: www.sherwin-williams.com.
      d. PPG Architectural Finishes, Inc: www.ppgaf.com.

B. Stains:
   1. Base Manufacturer: Benjamin Moore & Co: www.benjaminmoore.com.
   2. Other Acceptable Manufacturers:
      a. Olympic Stains: www.olympic.com.
      b. Minxwax: www.minwax.com

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
   1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.

2.03 PAINT SYSTEMS - EXTERIOR

A. Concrete/Masonry, Opaque, Alkyd, 3 Coat:
   1. One coat of block filler.
   2. Eggshell: Two coats of alkyd enamel.

B. Gypsum Board and Plaster, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer.
   2. Eggshell: Two coats of latex.

C. Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
   2. Eggshell: Two coats of alkyd enamel.

D. Ferrous Metals, Primed, Alkyd, 2 Coat:
   Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   Semi-gloss: Two coats of alkyd enamel.

E. Galvanized Metals, Alkyd, 3 Coat:
   1. One coat galvanize primer.
   2. Eggshell: Two coats of alkyd enamel.

F. Aluminum, Unprimed, Alkyd, 3 Coat:
   1. One coat etching primer.
   2. Eggshell: Two coats of alkyd enamel.

G. Pavement Marking Paint:
   1. Specified in Civil sections.

2.04 PAINT SYSTEMS - INTERIOR

A. Wood, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer.
   2. Eggshell: Two coats of latex enamel.

B. Concrete/Masonry, Opaque, Alkyd, 3 Coat:
   1. One coat of block filler.
   2. Eggshell: Two coats of alkyd enamel.

C. Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
   2. Eggshell: Two coats of alkyd enamel.

D. Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with alkyd primer.
   2. Eggshell: Two coats of alkyd enamel.

E. Galvanized Metals, Alkyd, 3 Coat:
   1. One coat galvanize primer.
   2. Eggshell: Two coats of alkyd enamel.

F. Aluminum, Unprimed, Alkyd, 3 Coat:
   1. One coat etching primer.
   2. Eggshell: Two coats of alkyd enamel.

G. Gypsum Board/Plaster, Latex-Acrylic, 3 Coat:
   1. One coat of alkyd primer sealer.
   2. Eggshell: Two coats of latex-acrylic enamel.

H. Fabrics/Insulation Jackets, Alkyd, 3 Coat:
   1. One coat of alkyd primer sealer.
   2. Eggshell: Two coats of alkyd enamel.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.
   4. Exterior Wood: 15 percent, measured in accordance with ASTM D 4442.

3.02 PREPARATION

A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.

H. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

J. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

L. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

M. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

N. Exterior Wood to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

O. Metal Doors to be factory painted.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Sand wood surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Touch-up painting to be conducted full height, from corner to corner. Spot touch-up is not allowed.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Division 23 and Division 26 for schedule of color coding of equipment, duct work, piping, and conduit.

B. Paint shop-primed equipment, where indicated.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Finish equipment, piping, conduit, and exposed duct work in utility areas in colors according to the color coding scheme indicated.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

3.06 CLEANING

A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.

2. Fire rating labels, equipment serial number and capacity labels.
3. Stainless steel items.

B. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
2. Paint shop-primed items occurring in finished areas.
3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of Eggshell black paint to visible surfaces.
4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

C. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

END OF SECTION

SECTION 10 11 00

VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Porcelain enamel marker boards with aluminum frames.
2. Porcelain enamel chalk boards with aluminum frames.
3. Tack boards with aluminum frames.

B. Related Requirements:

1. Section 097723 "Fabric-Wrapped Panels" for tackable, fabric-covered panels mounted on walls.
2. Section 101146 "Visual Display Fabrics" for visual display wall coverings intended for use with dry-erase markers.
3. Section 101200 "Display Cases" for individually framed and enclosed, wall-mounted bulletin boards.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Visual display board assemblies.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.

C. Shop Drawings: For visual display units.

1. Include plans, elevations, sections, details, and attachment to other work.
2. Show locations of panel joints, including locations of field-assembled joints for factory-fabricated units too large to ship in one piece, if any.
3. Show locations and layout of special-purpose graphics.
4. Include sections of typical trim members.

D. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes, and as follows:

1. Samples of facings for each visual display panel type, indicating color and texture.
2. Actual factory-finish color samples, applied to color anodized aluminum trim.
3. Include accessory Samples to verify color selected.

E. Product Schedule: For visual display units. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For manufacturer's special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For visual display units to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace Writanium® face sheets that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Surfaces lose original writing and erasing qualities.
b. Surfaces exhibit crazing, cracking, or flaking.

2. Warranty covers the cost of material replacement of defective Writanium® markerboards and chalkboards due to discoloration, crazing, cracking, or flaking. Warranty does not cover labor or miscellaneous material costs for removal and re-installation of markerboards and chalkboards.

3. Warranty Period:

a. Manufacturer’s "Forever Warranty", stating that under normal usage and maintenance, Writanium® Porcelain Markerboards and Chalkboards are guaranteed for the life of the building.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. 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: 50 or less.

2.2 VISUAL DISPLAY BOARD ASSEMBLIES

A. Visual Display Board Assemblies:

1. Basis of Design: Subject to compliance with the requirements, provide Platinum Visual Solutions "Box Tray (BTS)" Writanium® Porcelain Markerboard.
2. Prior to receipt of bids, additional Manufacturer's whose products equal or exceed the specified products in every regard to the specified products may request to be included as a specified manufacture by following procedures outlined in Division 01 Section "Substitution Procedures".

B. Visual Display Board Assembly: Factory fabricated.

1. Assembly **markerboard and tackboard**
2. Corners: Square.
3. Width: As indicated on Drawings.
4. Height: As indicated on Drawings.
5. Mounting Method: **Mechanically fastened directly to wall**

C. Markerboard Panel: Writanium® Porcelain-enamel-faced markerboard panel on 7/16-inch-thick particleboard core.

1. Color: As selected by Architect from Manufacturer's full range of colors.

D. Tackboard Panel: **Polyester-fabric-faced** tackboard panel on core indicated.
1. Color and Pattern: As selected by Architect from full range of Manufacturer's standard colors.

E. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; Type CH215 standard channel with ¾ inch face.

1. Aluminum Finish: **Clear anodic**

b. Color: As selected by Architect from full range of Manufacturer's standard colors and color densities.

F. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.

G. Combination Assemblies: Provide manufacturer's standard exposed trim between abutting sections of visual display panels.

H. Marker Tray: Manufacturer's standard; continuous.

1. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.

I. Display Rail: Manufacturer's standard, extruded-aluminum display rail with **linoleum impregnated cork** insert.

1. Size: **1 inch (25 mm)**
2. Map Hooks: One map hook for every 24 inches (600 mm) of display rail or fraction thereof.
3. Flag Holder: Two for each room.
4. Aluminum Color: Match finish of visual display assembly trim.

J. Panels and Accessories:

1. Display Rail: Manufacturer's standard, extruded-aluminum display rail with **linoleum impregnated cork** insert and end trim piece.

a. Aluminum Trim: Factory applied; in manufacturer's standard size and profile; with **Clear anodic** trim finish rest of unit.

2.3 MARKERBOARD PANELS

A. Porcelain-Enamel Markerboard Panels: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel (Writanium®) face sheet with **low**-gloss finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.

1. Manufacturer's Standard Core: Minimum 1/4 inch (6 mm) thick, with manufacturer's standard moisture-barrier backing.
2. Particleboard Core: 7/16 inch (11.1 mm) thick; with **0.015-inch- (0.38-mm-) thick, aluminum sheet**
3. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.

2.4 TACKBOARD PANELS

A. Tackboard Panels:

1. Facing:

a. 1/4-inch- (6-mm-) thick, natural cork.
b. **Polyester** fabric factory laminated to 1/4-inch- (6-mm-) thick, cork sheet.
c. ¼ inch-(6-mm) linoleum impregnated cork.

2. Core:

a. **Fabric or Vinyl covered ¼ inch natural cork on ¼" hardboard**

2.5 MATERIALS

A. Porcelain-Enamel Face Sheet (Writanium®): PEI-1002, with face sheet manufacturer's standard three-coat process.

B. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish[**; with surface-burning characteristics indicated**].

C. Vinyl Fabric: Mildew resistant, washable, complying with ASTM F793/F793M, Type II, **burlap weave**; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface-burning characteristics indicated.

D. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.

E. Linoleum: 1/4-inch- (6-mm-) thick homogeneous tackable surface material made of primary natural materials consisting of linseed oil, cork, rosin binders and dry pigments mixed and calendared onto a natural jute backing. The uni-color extends throughout the thickness of the material

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA AMP 500 for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603, except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.

B. Examine walls and partitions for proper preparation and backing for visual display units.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.

C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.

3.3 INSTALLATION

A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Field-Assembled Visual Display Board Assemblies: Coordinate field-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.

C. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated below.

1. Mounting Height for Grades K through 3: 24 inches (610 mm) above finished floor to top of marker or chalk tray.
2. Mounting Height for Grades 4 through 6: 28 inches (711 mm) above finished floor to top of marker or chalk tray.
3. Mounting Height for Grades 7 and Higher: 36 inches (914 mm) above finished floor to top of marker or chalk tray.

3.4 CLEANING AND PROTECTION

A. Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.

B. Touch up factory-applied finishes to restore damaged or soiled areas.

C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 101100

SECTION 10 14 00 - ARCHITECTURAL SIGNAGE

PART 1 – GENERAL

1.01 SCOPE

A. Furnish and install the following:

1. Exterior wall mounted school name (individual letters).
2. Building plaque.
3. Room identification signage.
4. Occupancy signage for all assembly areas per applicable sections of the International Building Code (IBC)
5. Brackets, clips, posts, fasteners, concrete footings, and all accessories required for proper installation of signage.

1.02 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:

1. Indicating materials, sizes, and finishes, indicate letter style, edge and corner treatment, details of fabrication and mounting installation, fasteners and hardware, attachments, related and adjacent work.

2. Electronic layout of actual pattern of cast metal plaque for Architect's approval prior to casting. Do not proceed with casting without architect’s review and approval.

C. Samples:

1. One (1) 6 inch by 6 inch sample of cast metal(plaque material with specified finish).
2. One (1) 4 inch actual sample of cast metal letter in specified letter style and finish.
3. One (1) actual sample of each type room identification sign with specified finish.

1.03 QUALITY ASSURANCE

A. All signage and signage installation shall comply with latest edition of Americans with Disabilities Act (ADAAG) and Texas Accessibility Standards (TAS)..

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Specifications are based on products and manufacturers listed as basis of specification or named. Products of manufacturers listed which 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 1 requirements regarding substitutions to be considered.

1. Approved Manufacturers:

   a. A.R.K. Ramos Architectural Signage Systems, Oklahoma City, OK; www.arkramos.com
   b. The Southwell Co., San Antonio, TX; www.southwellco.com
   c. South Texas Graphic Specialties, Inc. , Houston, www.stxgraphics.com
   d. In-Pro Corporation; www.inprocorp.com
   e. CCSW Architectural Graphics & Sign Systems, Corpus Christi, TX. www.ccswsignsystems.com
   f. Sign Resource Management, 512.863.9929; Seguin, TX

2.02 CAST METAL BUILDING LETTERS

A. Material and Fabrication:

1. Casting shall be of 319 aluminum alloy with satin polished faces and matte sides.
2. Letters shall be finished in clear anodized finish.

B. Letters shall be San Serif style upper case letters, unless shown otherwise. Allow for twenty-six (26) 18” high letters and twenty-four (24) 12” high letters.

C. Fasteners and Attachment Hardware: Concealed fasteners and hardware of size and type recommended by manufacturer for attachment of letters on brick wall where indicated on drawings.

D. Provide all materials required for a complete installation.

2.03 BUILDING PLAQUE

A. Furnish and install 18” x 24” aluminum plaque equal to that as manufactured by Southwell Company, San Antonio, Texas. Plaque shall contain no more than five hundred (500) letters and thirty (30) lines. Metal Arts, ASI, Mills Mfg. Company, and Sign International, Inc. are also approved manufacturers.

1) Cast virgin ingots, F-214 aluminum alloy. Casting shall be free of pits and gas holes and all letters shall be sharp and hand tooled.

2) Single line border; border and faces of raised letters are to be satin finish and plaque background to be leatherette texture. Background shall be sprayed with black acrylic lacquer. Plaque shall be chemically cleaned and etched and treated with alodine. Two coats of clear acrylic lacquer shall be sprayed on completed plaque.

3) Letter style shall be San Serif.

4) Plaque shall be mounted on masonry wall with concealed fastening.

5) Architect will furnish plaque design and general layout. Contractor will furnish rubbing of actual pattern for owner’s approval prior to casting.

2.04 ROOM IDENTIFICATION SIGNAGE

A. General:

1. Provide one (1) sign for every room. Provide ten (10) additional signs to be located as directed by architect. Exact numbering / wording on signs to be provided by architect at the appropriate time.

2. Signs shall be constructed using clear non-glare acrylic surface with subsurface colored acrylic plates.

a. Thickness: Min 1/8” or as noted
b. Edges: Machine Finish
c. Corners: Radius 3/8” or square as noted
d. Font: San Serif (upper case only)
e. Background Color: As selected by Architect
f. Copy Color: As selected by Architect
g. Size: 8” x 8” unless noted otherwise

h. Raised tactile grade 2 Braille shall be integral with the sign face and be raised 1/32”. Glass or metallic rasters to have .059 surface diameters with body of sphere pressure secured below face laminate. Glued on dots will NOT be acceptable.

i. Raised symbols shall be raised 1/32” from sign face and unitized with the acrylic sign core.

j. All raised lettering shall be 5/8” high (min) to 2” maximum, raised 1/32” and be integral with the sign face; letter style to be Helvetica Medium; Helvetica Regular Condensed (all upper case).

k. All copy (lettering, numbering & symbols) shall have a contrast with their background and have an eggshell matte finish.

3. Demarcation line, if any, shall be infilled to match copy color.

4. Signs shall comply with all state and federal codes, including, but not limited to the ADA and TAS requirements.

5. Refer to drawings for signage details for dimensions, types, colors, graphic layout, and mounting and height specifications.

B. Room Numbers, Symbols, and Restroom Copy:

1. Shall be raised 1/32 inch, of a color contrasting to the sign face color.

2. Characters and pictograms shall be chemically welded to the acrylic backing, through the face laminate, to assure permanent adhesion.

3. Room numbers and restroom copy shall be accompanied by Grade II braille by means of "VisiTouch Duradot System". Glass or metallic "Durodots" shall have 0.059 inch surface diameter with body of sphere pressure secured to face.. Routed boxes or glued on dots are not acceptable.

C. Lower or Secondary Copy:

1. Shall be a minimum of 5/8 inch high incised sans serif style, (Helvetica, Optima, Futura as selected by Architect), all caps, paint-filled in a color as selected by Architect.

D. Restroom Pictograms:

1. Shall appear on a minimum six (6) inch square, unobstructed field.

E. Window (Slotted) Signs:

1. Shall be open on both ends for an insert by Owner, window shall be a non-glare acrylic window, with an exposed color behind in color as selected by Architect.

F. Fasteners and Accessories:

1. 1/8 inch thick, double-sided foam tape of type recommended to suit application and commercial grade silicone sealant.

2. Back-up plates shall be supplied, where shown or required, for signage mounted on glass.

G. Provide all materials required for a complete installation.

2.05 OCCUPANCY LOAD SIGNAGE

A. Provide every room or space that is an assembly occupancy one sign with the occupant load of the room or space posted in a conspicuous place, near the main exit or exit access doorway from the room or space.

B. Occupancy signs shall match type, style and size of specified room identification signs.

C. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or authorized agent.

D. Include assembly area occupancy signage similar to room identification signs.

1. Rooms or areas to have occupancy load signage include but are not limited to the following:

a. Multi-purpose Rooms
b. Cafeteria
c. Auditoriums
d. Stages
e. Libraries
f. Gymnasiums
g. Any room having an occupant load of 50 or more where fixed seating is not installed and which are used as assembly areas.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install signage level, plumb and at height required for disabled accessibility as required by Texas Accessibility Standards (TAS) and ADA. Locate signage as directed by Architect.

B. All architectural signage items shall be securely mounted with first quality anchors; mechanical mounting with sheet metal/wood or tap-in (for concrete block) screws, full threaded, one-way theft resistant. Mount level and square to surrounding surfaces. Location as directed by Architect.

C. At completion of work, clean signage in accordance with manufacturer's instructions. Clean surrounding materials to remove dust, materials, etc.

D. Room Identification Signs:

1. Install in accordance with manufacturer's instructions and in locations shown on drawings.

2. Installation shall be by means of double sided tape and silicone.

3. Tactile characters on signs shall be located a min of 48 inches above finished floor or ground surface, measured from the baseline of the lowest tactile character and 60 inches maximum above finished floor or ground surface measured from the baseline of the highest tactile character on the wall adjacent to the latch side of the door.

4. Signs containing tactile characters shall be located so that a clear floor space of 18 inches min. by 18 inches min., centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degrees open position.

5. Signs with tactile characters shall be permitted on the push side of doors with closers and without hold-open devices

6. Where there is no wall space, including double leaf doors, sign shall be placed on the nearest adjacent wall.

7. Where shown or required, mount signs on glass using back-up plates.

END OF SECTION 10 14 00

SECTION 10 2601

WALL AND CORNER GUARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Bumper Rails.

B. Corner guards.

1.02 REFERENCE STANDARDS

A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.03 SUBMITTALS

A. See Section 01 3000 – Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

C. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Bumper Rails: Factory- or shop-fabricated, with preformed end caps and internal and external corners:
   1. Performance of Installed Assembly:
      a. Resist lateral force of 250 lbs at any point without damage or permanent set.
   2. Material: Type 430 stainless steel, No. 4 finish.
   3. Mounting: Surface.
   4. Projection From Wall to Outside of Rail: 3/4 inch.
   5. Return rail to wall.

B. Corner Guards, Stainless Steel (Where indicated on Drawings) - Flush Mounted:
   1. Material: Type 430 stainless steel, No. 4 finish, 16 gage.
   2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
   3. Width of Wings: 1-1/2 inch to 3-1/2 inch based on condition
   4. Corner: Square.
   5. Length: Floor to ceiling.
   6. Mounting: Provide corner guards with countersunk holes for attachment screws.

C Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.
   1. For corner guards, attach with adhesive backing and secure with countersunk screws.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that field measurements are as indicated on Drawings.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

END OF SECTION

SECTION 10 28 00
TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following toilet accessory items:

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.

B. Product Data for each toilet accessory item specified, including details of construction relative to materials, dimensions, gages, profiles, method of mounting, specified options, and finishes.

C. Schedule: Indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for project.

D. Setting Drawings: Where cutouts are required in other work, provide templates, substrate preparation instructions, and directions for preparing cutouts and for installation of anchorage devices.

1.3 QUALITY ASSURANCE

A. Inserts and Anchorages: Furnish inserts and anchoring devices that must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.

B. Single-Source Responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to Architect.

1.4 PROJECT CONDITIONS

A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference and to assure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

1.5 WARRANTY

A. Special Project Warranty: Provide manufacturer's written 5-year warranty against silver spoilage of mirrors, agreeing to replace any mirrors that develop visible defects within warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include the following:

1. Toilet and Bath Accessories

a. A&J Washroom Accessories 845-562-3332 www.ajwashroom.com
b. American Specialties, Inc. 914-476-9000 www.americanspecialties.com

c. Bobrick Washroom Equipment, Inc. 800-553-1600 www.bobrick.com
d. Bradley Corporation 800-272-3539 www.bradleycorp.com
e. GAMCO Commercial Restroom Accessories, A Division of Bobrick Washroom Equipment, Inc. 518-877-7444 www.gamcousa.com
f. McKinney/Parker
g. PSISC 866-337-7286 www.psisc.com

2.2 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gage (0.034 inch) minimum thickness, unless otherwise indicated.

B. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16, Castings, ASTM B-30.

C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 20 gage (0.040 inch) minimum, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.

D. Galvanized Steel Sheet: ASTM A 527, G60.

E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.

F. Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.

G. Vinyl-Backed Safety Mirror Glass: Nominal 6.0 mm (0.23 inch) thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro- plated copper coating, and protective organic coating. Apply vinyl backing with pressure-sensitive adhesive coating over glass coating by method recommended by vinyl-backing manufacturer to produce a surface free of bubbles, blisters, or other imperfections. Use adhesives and vinyl backing compatible with glass coating as certified by organic coating manufacturer.

H. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

I. Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

J. Keys: Unless otherwise indicated, provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide minimum of six (6) keys to Owner's representative and obtain receipt.

2.3 TOILET TISSUE DISPENSERS/PAPER TOWEL DISPENSERS

A. Owner supplied and Contractor installed

2.4 GRAB BARS

A. Stainless Steel Type: Provide grab bars with wall thickness not less than 18 gage (0.050 inch) and as follows:
1. Basis of Design: GAMCO Min. 150 Series or approved equal.
2. Mounting: Concealed, manufacturer's standard flanges and anchorages.

B. Clearance: 1-1/2 inches clearance between wall surface and inside face of bar.

C. Gripping Surfaces: Smooth, satin finish.

D. Heavy-Duty Size: Outside diameter of 1-1/2 inches.

E. Provide horizontal and vertical grab bars at water closets or showers
1. Length:

a. 42 inches at sides of water closet
b. 36 inches behind water closet.
c. 40” x 54” at shower grab bar; refer to drawings for locations

2.5 SOAP DISPENSERS

A. Owner furnished and Contractor installed

2.6 MOP AND BROOM HOLDER

A. Surface mounted mop and broom holder; made of 22 gauge stainless steel with satin finish with spring activated rubber cam holders
1. Basis of Design: Model 9953 – 3 holders; Bradley Corp.

2.7 MIRROR UNITS

A. Stainless Steel Framed Mirror Units
1. Basis-of-Design: GAMCO 'A' Series- 1/4” Tempered or approved equal

2.8 ELECTRIC HAND DRYER

A. Electric Hand Dryer: 115 volt, 20 amp
1. Provide surface-mounted unit; ADA compliant unit
2. Basis-of-Design: Saniflow M06ACS-UL Speedflow or approved equal.
3. Finish-Brushed Stainless Steel

2.9 ROBE HOOKS

A. Bobrick B-2116 or approved equal

2.10 SANITARY NAPKIN DISPOSALS

A. GAMCO ND1 or approved equal

2.11 SANITARY NAPKIN DISPENSER

A. GAMCO NV-2-4FS or approved equal

B. Install at nurses office or per campus staff recommendation

2.12 PAPER TOWEL DISPENSERS

A. Owner furnished and Contractor installed

2.13 SHOWER CURTAIN ROD WITH VINYL CURTAIN

A. Bobrick B207 (Sized for opening) or approved equal.

2.14 ADA Compliant Under Lavatory Tubular

A. Plumberex – Pro-extreme – 3PC Kit White

2.15 FABRICATION

A. General: Only a maximum 1-1/2 inch diameter, unobtrusive stamped logo of manufacturer, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all welded construction, without mitered corners. Hang doors or access panels with full-length stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.

D. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent accumulation of moisture, as follows:

1. Provide galvanized steel backing sheet, not less than 22 gage (0.034 inch) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror Unit Hangers: Provide system of mounting mirror units that will permit rigid, tamperproof, and theftproof installation, as follows:

1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring special tool to remove.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install toilet accessory units in accordance with manufacturers' instructions, using fasteners appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.

C. Install grab bars to resist tensile and moment forces generated by a load of 250 lb. applied in any direction, or as otherwise required by authorities having jurisdiction, whichever is more stringent.

D. Provide blocking as required for accessories.

3.2 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces in strict accordance with manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 10 28 00

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

1.02 REFERENCES

A. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.03 PERFORMANCE REQUIREMENTS

A. Conform to applicable code and NFPA 10.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.04 SUBMITTALS

A. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, and location.

B. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.

C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Drawings and specifications are based on manufacturer's literature from Larsen's Manufacturing Company unless otherwise indicated. Other manufacturers to comply with the minimum levels of material and detailing indicated on the drawings and in conformance with provisions of Section 01 6000 – Product Requirements. www.larsensmfg.com

B. Other Acceptable Manufacturers: Fire Extinguishers and Cabinets.
   1. JL Industries, Inc: www.jlindustries.com.
   2. Larsen's Manufacturing Co: www.larsensmfg.com.
   3. Potter-Roemer: www.potterroemer.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Multi-Purpose Dry Chemical Type (Unless noted otherwise): Stainless steel tank, with pressure gage.
   1. Size and classification: MP-10 as manufactured by Larsen’s Manufacturing Company.

2. Finish: Baked enamel, red.

B. Kitchen Extinguisher: Larsen's WC Series Wet Chemical unit, 2.5 gallon, rated for type K fires. Provide Larsen's mounting bracket 1007 for kitchen extinguisher.

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Extinguisher Cabinet with Fire Blanket (Science Classrooms): Architectural Series Model No. AL FB3612-RL, semi-recessed, with fire blanket, as manufactured by Larsen's Manufacturing.
   1. All-aluminum construction.
   2. White baked enamel finish.
   3. Handle: FH Red, die cast, raised letters.
   4. Extinguisher: MP10 manufactured by Larsen's Manufacturing Company.

B. Fire Extinguisher Cabinet without Blanket (All other areas): Architectural Series Model No. AL2712-RA, semi-recessed, as manufactured by Larsen's Manufacturing.
   1. All-aluminum construction, with door glass.
   2. White baked enamel finish.
   3. Handle: FH Red, die cast, raised letters.
   4. Extinguisher: MP10 manufactured by Larsen's Manufacturing Company.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level at heights indicated on drawing schedule.

C. Place extinguishers in cabinets.

END OF SECTION

SECTION

10 7516 - FLAGPOLE

PART 1 - GENERAL REQUIREMENTS

1.01 SCOPE

A. Provide and install ground-set aluminum flagpole, accessories, foundation and flags.

B. Quantity required: Refer to Drawing Floor Plans for total quantity of poles.

1.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of wind loads, determined according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles."

1. Base flagpole design with polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2. Basic Wind Speed: min. 95 mph; 3-second gust speed at 33 feet above ground.

1.03 SUBMITTALS

A. Product Data: For each type of flagpole required.

B. Structural Calculations: For flagpoles indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Qualification Data: For professional engineer.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain each flagpole as a complete unit, including fittings, accessories, bases, and anchorage devices, from a single manufacturer.

1. Obtain flagpoles through one source from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - MATERIALS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Flagpole www.americanflagpole.com
2. The Baartol Company Inc. www.baartol.com
3. Concord Industries, Inc. www.concordindustries.com
4. Carrot-Top Industries www.carrot-top.com
5. Concord Industries www.concordindustries.com
6. Eder Flag Manufacturing Co. www.ederflag.com
7. Pole-Tech Company Inc. www.poletech.com
8. Morgan-Francis Co., www.morgan-francis.com
9. United States Flag Store, www.united-states-flag.com
10. Flagpoles Etc. www.flagpolesetc.com

2.02 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

B. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.

C. For tapered flagpoles, provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

D. Exposed Height: 35 feet.

E. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/ (B 241 M), Alloy 6063, with a minimum wall thickness of 3/16 inch. Heat treat after fabrication to comply with ASTM B 597, Temper T6.

F. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.064-inch minimum nominal wall thickness. Provide with 3116-inch steel bottom plate and support plate; 3/4 inch diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

1. Provide flashing collar of same material and finish as flagpole.

2.03 FITTINGS

A. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous 5/16 inch diameter, braided steel halyard and 9-inch cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

1. Provide one halyard and one cleat at each flagpole.

2. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.

3. Provide halyard covers consisting of a 2-inch channel, 60 inches long, finished to match flagpole.

B. Halyard Flag Snaps: Provide four (4) stainless-steel swivel snap hooks per halyard.

C. 6-inch diameter fineal ball and standard; non-fouling ball bearing truck. Cleats: 9” standard cleats.

D. 16-gauge galvanized foundation sleeve with base plate, self-centering wedges and lightning protection ground spike.

E. Continuous braided #10 diameter polypropylene halyard with swivel flag snaps. Provide cast aluminum cleat cover for padlock installation.

F. Flagpole and all accessories to receive machined 80-120 grit satin-brushed finish.

G. Provide external halyard complete assembly, truck assembly, etc. Provide spun aluminum flash collar.

2.04 MISCELLANEOUS MATERIALS

A. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

B. Sand: ASTM C 33, fine aggregate.

C. Elastomeric Joint Sealant: Single-component neutral-curing silicone joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

2.05 FLAGS

A. Commercial-quality nylon, 5 x 8-foot size; furnish one flag of each of the following types, per flag pole:
   1. United States,
   2. State of Texas.

2.06 FINISHES

A. Metal Finishes, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Aluminum: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   1. Class 1, Clear Anodic Finish: AA-M12C2A41 (Mechanical Finish: nonsecular as fabricated; Chemical Finish: etched, medium matte); Anodic Coating: Architectural Class 1, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms and foundation tube, sleeve, or anchor bolts in position, to prevent displacement during concreting.

D. Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.02 FLAGPOLE INSTALLATION

A. General: Install flagpoles were shown and according to manufacturer's written instructions.

B. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 10 75 16

SECTION 12 24 14

MOTORIZED WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Motorized, roll-up fabric interior window shades including motor operator, controls, and mounting hardware.

1.2 RELATED SECTIONS

A. Section 06100 [06 10 00] – Rough Carpentry: Blocking for support of window shade hardware.

B. Section 07900 [07 90 00] - Joint Sealers: Sealants for perimeter of shade system.

C. Section 09260 [09 21 23] - Gypsum Board Assemblies: Suspended gypsum board ceilings to contain recessed window shade pockets.

D. Section 09510 [09 51 23] - Acoustical Tile Ceilings: Suspended acoustical panel ceilings to contain recessed window shade pockets.

E. Section 11132 [11 52 13] - Motorized Projection Screens: Motorized projection screens to be interfaced with shade controls.

F. Section 11132 [11 52 13] - Motorized Projector Lifts: Motorized projector lifts and mounts to be interfaced with shade controls.

G. Division 16 [26] - Electrical: Electrical supply, conduit, and wiring for motorized window shades.

1.3 REFERENCES

A. NFPA 70 - National Electrical Code.

B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

C. ANSI/WCMA A100.1-2022.

1.4 SUBMITTALS

A. Submit under provisions of Section 01330 - Submittal Procedures:

B. Product Data: Manufacturer's data sheets on each product specified, including:
   1. Preparation instructions and recommendations.
   2. Installation and maintenance instructions.
   3. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
   4. Storage and handling requirements and recommendations.

5. Mounting details and installation methods.
6. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work. Location of switches shall be shown on plans and coordinated with other trades.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, two complete sets of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, two complete sets of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

H. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section. Manufacturers that do not meet the required experience requirements must submit life cycle test data showing minimum 2000 complete operational cycles for each year of warranty showing no failure and that shade remains fit for use as an operable shade).

B. NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use. Show complete manufacturer data (name,location,contact) and certification from manufacturer that the fabrics sourced for this project comply with the test data provided.

C. Mock-Up: Provide a mock-up of one of each type roller shade assembly specified for evaluation of mounting, appearance and accessories.
1. Locate mock-up in window(s) designated by Architect.
2. Do not proceed with remaining work until mock-up is accepted by Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.

B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.

C. Label containers and shades according to Window Shade Schedule.

D. Store products in manufacturer's unopened packaging until ready for installation.

1.7 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

A. Install roller shades after finish work and ambient temperature, humidity and ventilation conditions are maintained at levels recommended for project upon completion.

1.9 WARRANTY

A. Hardware and Shade Fabric: Draper’s standard twenty-five year limited warranty.

B. Motors and Controls: Draper’s standard five year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Draper, Inc. Sales offices and manufacturing facility located at: 411 S. Pearl P. O. Box 425; Spiceland, IN 47385-0425. ASD. Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Fax: 866-637-5611; Web: www.draperinc.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INTERMEDIATE SIZE MOTORIZED WINDOW SHADES

A. Type: Motorized vertical roll-up, fabric, window shade with motors, controls, mounting brackets, and other components necessary for complete installation; Motorized FlexShade® 2 as manufactured by Draper, Inc.
   1. Mounting brackets.
   2. Endcaps and fascia.
   3. Endcaps and ceiling/wall headbox.
   4. Endcaps with pocket headbox.

B. Shade Motor and Control System
   1. FlexShade 2 120V AC motor. Single phase, 60 HZ, instantly reversible, lifetime lubricated, and equipped with internal thermal overload protector, electric brake, and pre-set accessible limit switches. Tubular motor concealed inside each shade roller tube.
   2. FlexShade 2 Quiet 120V AC motor. Operates at 44 Db measured 3 feet from the motor. Makes no audible clicks when motor stops or starts. Tubular motor concealed inside each shade roller tube.
      a. Individual Control:

1) Wall Switch - Toggle three position wall switch.

b. Group Control:

1) 1 Motor Isolating Relay (1ISO) – One ISO relay per motor. Allows 110-120V group switching. Allows for up to 12 motors on one double throw switch. Input Voltage: 120V AC/60Hz. Output Voltage: 120V AC/60Hz. Max Output Current: 4.0 Amps.

c. Individual and Group Control:

1) IGC4N1. Individual and Group control of up to four motors with up to three intermediate positions per motor.

3. Roller: Size–4 inch (102 mm) or 5 inch (127 mm) O.D. steel tube. Size at manufacturer's discretion.
4. Roller Idler Assembly: Zinc-plated steel shaft supported by roller bearings in an aluminum housing.
5. Slat: 13/16" aluminum dowel, encased in heat seamed hem.
6. Mounting

a. Endcaps: 1028 steel stamping. Complete with adapter roller bracket. Installs to wall, ceiling, or jamb. Accepts fascia or headbox.

1) Finish: Custom powder coat as selected by the Architect.

b. Brackets: 1018 plated steel stamping, suitable for mounting to wall, ceiling, or jamb. Brackets do not require additional adapters.

c. Fascia: 6½ inch x 6½ inch (165 x 165 mm) square cover of extruded aluminum, .125 inch (3.175 mm) wall.

1) Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind.
2) Finish: Selected from Manufacturers standard range.
3) Finish: Custom powder coat as selected by the Architect.

d. Headbox Ceiling/Wall Style: 6-5/8" x 6-5/8" (168 x 168 mm) square fascia and L-shaped back/top cover to be fabricated of extruded aluminum:

1) Finish: Custom powder coat as selected by the Architect.

e. Pocket headbox constructed of extruded aluminum. Bottom of headbox fully enclosed except for slot allowing fabric passage. Bottom closure panel shall be extruded aluminum, finished white, and may be removed manually for access to roller and drive unit. Aluminum endplates with integrated steel brackets for suspended mounting shall be fastened to extruded headbox with thread-cutting screws.

1) Ceiling Tile Flange: 12 foot (366 cm) extruded aluminum, finished white. Attaches to pocket headbox. Hardware for attachment to headbox included.
2) Endcap Ceiling Tile Flange: Extruded aluminum, finished white. Available on one or both endcaps.

2.3 FABRIC

A. Light-Filtering Fabrics

1. PVC Coated Fiberglass

a. Basketweave

1) E Screen 5% by Mermet: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD and GREENGUARD Gold standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E 2180, ASTM G21. Average 5 percent open, .016 inches thick, 10.7 oz/square yard.

B. Color and pattern: As selected by Architect from manufacturer's standard range.

C. Custom Printed Graphics: As submitted to manufacturer in accordance with manufacturer’s guidelines.

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. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

B. Coordinate requirements for blocking, construction of shade pockets, and structural supports to ensure adequate means for installation of window shades.

C. Coordinate installation of recessed shade pockets with construction of suspended acoustical panel ceilings specified in Section 09510.

D. Coordinate installation of recessed shade pockets with construction of suspended gypsum board ceilings specified in Section 09260.

E. Coordinate requirements for power supply conduit, and wiring required for window shade motors and controls.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.

C. Shade pockets:
1. Install shade pockets prior to installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
2. Shades in storm shelter will need to penetrate steel channel as windows are storm rated. Provide correct mounting screws that will penetrate steel channel.
3. Install shade pockets in conjunction with installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
4. Install corner pieces securely and in alignment with pockets.
5. Install pocket ends securely and in alignment with pockets.
6. After interior construction is essentially complete, install shade and operating mechanism in pocket.

D. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

3.4 TESTING AND DEMONSTRATION

A. Test motorized window shades to verify that controls, limit switches, interface to other building systems, and other operating components are functional. Correct deficiencies.

B. Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.
   1. Motorized operating mechanism.

C. Demonstrate operation of shades to Owner's designated representatives.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 SCHEDULES

A. Refer to Drawings for shade types and locations.

END OF SECTION

SECTION 12 3600

COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid surface and plastic laminate countertops for architectural cabinetwork.

1.02 REFERENCES

A. ANSI A208.1 - American National Standard for Particleboard; current edition.

B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; current edition.

C. ANSI Z124.3 - American National Standard for Plastic Lavatories; current edition.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; current edition.

E. AWI/AWMAC (QSI) - Quality Standard Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2006, 8th Ed., Version 2.0.

F. ISSFA-2 - Classification and Standards for Solid Surfacing Material; International Solid Surface Fabricators Association; current edition

G. NEMA LD 3 - High-Pressure Decorative Laminates; current edition.

H. PS 1 - Construction and Industrial Plywood; current edition.

1.03 SUBMITTALS

A. See Division 1 sections 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. Installation Instructions: Manufacturer's installation instructions and recommendations.

H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Installation by fabricator.

1.05 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.

1.06 PROJECT 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.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: ¾ inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISSFA-2 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. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E 84.
      b. NSF approved for food contact.
      c. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with ANSI Z124.3.
      d. Finish on Exposed Surfaces: As approved by Architect.
      e. Color and Pattern: As designated in the 'Finish Schedule' on Drawings.
      f. Manufacturers:
         1) Dupont: www.corian.com.
         2) Substitutions: See Section 01 6000 Product Requirements for substitution procedures.
   3. Other Components Thickness: 1/2 inch, minimum.
   4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; radiused edge.
   5. Back and End Splashes: Same sheet material, radiused top; minimum 4 inches high.

B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
   1. Laminate Sheet: NEMA LD 3, Grade HDS, 0.048 inch nominal thickness.
      a. Manufacturers: Wilsonart; www.wilsonart.com
      b. Color and pattern: As designated in the 'Finish Schedule' on the Drawings.

2.02 ACCESSORY MATERIALS

A. Plywood for Supporting all Substrate: FSC Certified PS 1 Exterior Type, AC veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

C. 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; color as selected. To be applied to all splashes with the exception of tile splashes.

D. Joint Sealant: Mildew-resistant silicone sealant, color approved by Architect. To be applied at all casework and millwork joints, corners and where at dissimilar materials.

2.03 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. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   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 up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

C. 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.

3.04 TOLERANCES

A. Variation from Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset from Wall, Counterops: 1/8 inch maximum, 1/16 inch, minimum.

C. Field Joints: 1/16 inch, wide, maximum.

3.05 CLEANING AND PROTECTION

A. Clean countertops surfaces thoroughly.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 36 53

LABORATORY WORKSURFACES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Epoxy resin worksurfaces and accessories.
   2. Setting materials.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. D570 - Standard Test Method for Water Absorption of Plastics.
   2. D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plasticsin a Horizontal Position.
   3. D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Oad in edgewise Position.
   4. D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
   5. D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between 30^0 C and 30^0 C With a Vitreous Silica Dilatometer.
   6. D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials.
   7. D790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plasticsand Electrical Insulating Materials.
   8. D792 - Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
   9. D3801 - Standard Test Method for Measuring the Comparative Burning Characteristics ofSolid Plastics in a Vertical Position.

B. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials. NSF International / American National Standards Institute (NSF/ANSI) - 51 - Food Equipment Materials.

C. Scientific Certification Systems (SCS) - Recycled Content Certifications.

D. Scientific Equipment and Furniture Association (SEFA) 3 - Work Surfaces.

1.3 SUBMITTALS

A. Submittals for Review:
   1. Shop Drawings:
      a. Submit plan, section, elevation and perspective drawings necessary to describe and convey layout, profiles, and product components, including edge conditions, joints, fitting and fixture locations, anchorage, accessories, and finish colors.
      b. Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on Shop Drawings.
      c. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
   2. Product Data: Manufacturer's data sheets on each product to be used, including:
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.
   3. Samples:
      a. Selection samples: For each finished product specified, submit complete set of

color chips representing manufacturer's full range of standard colors.
b. Verification samples: For each finished product specified, submit samples representing actual product color; supplied product color and gloss may vary slightly from supplied samples.

B. Quality Control Submittals:
1. Test Reports: Certified test reports or recognized evaluation reports showing compliance with specified performance characteristics and physical properties.

C. Closeout Submittals:
1. Maintenance Data:
a. Provide maintenance, cleaning, and life cycle information.
b. Include recommended cleaning materials and procedures and list of materials detrimental to epoxy resin.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Primary products furnished by single manufacturer with minimum 10 years [documented] experience in work of this Section.
2. Products manufactured in ISO 9001 certified facility.

B. Installer Qualifications: Minimum [5] [ ] years [documented] experience in work of this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
1. Use pallets larger than sheets during transportation.
2. Package materials to prevent damage during shipping and handling.

B. Storage:
1. Store products in enclosed areas protected from ultraviolet.
2. Store products in manufacturer's unopened packaging until ready for installation.
3. Store panels using protective dividers to avoid damage to surfaces.
4. For horizontal storage, store sheets on pallets of equal or greater size than sheets with protective layer between pallet and sheet and on top of uppermost sheet.
5. Do not store sheets or fabricated panels vertically.

C. Handling:
1. If protective film is provided, do not remove until panel has been installed.
2. Handle sheets to prevent damage.
3. Remove stickers immediately after installation.

1.6 PROJECT CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's limits.

B. Avoid direct exposure of products to sunlight.

C. Do not use worksurfaces as bench, ladder, or seating.

PART 2 PRODUCTS

2.1 MATERIALS

A. Solid Epoxy Resin:
1. Sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture

cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.

2. Sheets monolithic throughout without surface coating application.
3. Physical properties; minimum acceptable physical performance in accordance with SEFA3 testing procedures:
   a. Density/specific gravity: Tested to ASTM D792; minimum test rating of 134.8 PSF or 2.16 gcm.
   b. Rockwell hardness: Tested to ASTM D785; minimum M scale rating of 110.
   c. Fire resistance: tested to ASTM D635; classified as self-extinguishing.
   d. Surface burning characteristics: Tested to ASTM E84; flame spread index 7.4 and smoke develop index of 221.2.
   e. Surface burning characteristics in vertical position: Tested to ASTM D3801; maximum flame spread index of 7.4 and smoke developed index of 221.2.
   f. Coefficient of linear thermal expansion: Tested to ASTM D696; rating of 2.46 x 10-5.
   g. Heat deflection: Tested to ASTM D648; maximum 205 degrees F or 96 degrees C.
   h. Flexural strength: Tested to ASTM D790; minimum rating 14.9 KPSI or 103 Mpa.
   i. Flexural modulus: Tested to ASTM D790; 2,777,501 PSI or 19.2 Gpa.
   j. Water absorption, 24 hours: tested to ASTM D570; maximum 0.008 percent by weight.
   k. Compression strength: Tested to ASTM D695; minimum 38.4 kpsi or 265 Mpa.
   l. Chemical resistance; minimum acceptable chemical resistance performance in accordance with SEFA 3:

REAGENT TESTED	METHOD	RATING
Amyl Acetate	A	0
Ethyl Acetate	A	0
Acetic Acid, 98%	B	0
Acetone	A	1
Acid Dichromate, 5%	B	0
Butyl Alcohol	A	0
Ethyl Alcohol	A	0
Methyl Alcohol	A	1
Ammonium Hydroxide, 28%	B	0
Benzene	A	1
Carbon Tetrachloride	A	0
Chloroform	A	1
Chromic Acid , 60%	B	0
Cresol	A	0
Dichloracetic Acid	A	0
Dimethyl formamide	A	0
Dioxane	A	0
Ethyl Ether	A	0

Formaldehyde, 37%	A	0
Formic Acid, 90%	B	0
Furfural	A	1
Gasoline	A	0
Hydrochloric Acid, 37%	B	0
Hydrofluoric Acid , 48%	B	0
Hydrogen Peroxide, 28%	B	0
Tincture of Iodine	B	0
Methyl Ethyl Ketone	A	0
Methylene Chloride	A	0
Monochlorobenzene	A	0
Naphthalene	A	0
Nitric Acid , 20%	B	0
Nitric Acid, 30%	B	1
Nitric Acid, 70%	B	1
Phenol, 90%	A	0
Phosphoric Acid, 85%	B	1
Silver Nitrate, Saturated	B	0
Sodium Hydroxide, 10%	B	1
Sodium Hydroxide, 20%	B	1
Sodium Hydroxide, 40%	B	1
Sodium Hydroxide, Flake	B	1
Sodium Sulfide, Saturated	B	2
Sulfuric Acid, 25%	B	1
Sulfuric Acid, 85%	B	2
Sulfuric Acid, 96%	B	3
Sulfuric Acid, 85% & Nitric Acid , 70%, Equal Parts	B	3
Toluene	A	1
Trichloroethylene	A	0
Xylene	A	0
Zinc Chloride, Saturated	B	0

4. Testing Method Descriptions:

Method A - Volatile chemicals (organic solvents): Cotton ball saturated with test reagent is placed in one-ounce bottle (20 x 75mm test tube or similar container) with reservoir of liquid above ball. Container is inverted on test material for period of 24 hours at standard temperature 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

Method B - Non-Volatile Chemicals: Five drops (1/4 cc) of test reagent are placed on test material surface. Reagent is then covered with watch glass (25 mm) for period of no less than 24 hours at standard temperature of 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

5. **Result Definitions:**
   0 - No Effect: No detectible change in material surface.
   1 - Good: Slight detectable change in color or gloss but no change to function or life of work surface material.
   2 - Fair: Slight surface etching or severe staining. Clearly discernable change in color or gloss but no significant impairment of surface life or function.
   3 - Poor: Pitting, cratering or erosion of work surface material; obvious and significant deterioration. Objectionable change in appearance due to surface discoloration.
6. Color: To be selected from manufacturer's standard color range.

2.2 ACCESSORIES

A. Provide solid epoxy resin [laboratory shelving] [laboratory fume hood base work surfaces][pegboards] [reagent racks] where indicated.

B. Installation Materials: Manufacturer's joint adhesive, panel adhesive, and sealants as required to suit project conditions.

2.3 FABRICATION

A. Fabricated tops and accessories in accordance with manufacturer's recommendations, approved Shop Drawings, and SEFA 3.

B. Epoxy Resin Worksurfaces:
   1. Thickness:
      a. [3/4 inch (19 mm)] [1 inch (25 mm)] [1-1/4 inches (32 mm)] unless otherwise indicated.
      b. Check each sheet at factory for required thickness.
      c. Maximum variation in thickness: plus or minus 1/16 inch (1.6 mm) from corner to corner.
   2. Warpage:
      a. Inspect tops for warpage prior to fabrication by placing on true flat surface.
      b. Maximum allowable warpage: 1/16 inch (1.5 mm) in 36 inch (900 mm) span or 3/16 inch (4.5 mm) in 96 inch (2400 mm) span.
   3. Fabrication:
      a. Shop fabricate in longest practical lengths.
      b. Bond joints with highly chemical resistant cement with properties and color similar to base material.
      c. Provide 1/8 inch (3 mm) drip groove at underside of exposed edges, set back 1/2 inch(13 mm) from face.
      d. Finish exposed edges.
   4. Fabricate tops flat with 1/4 inch (6 mm) raised marine edge. Flat with 1/4 inch (6 mm) raised marine edge at epoxy sink locations.
   5. Edge treatment: Standard 1/4 inch (2 mm) radius edge with drip groove.
   6. Corner treatment: exposed corners shall be eased slightly for safety.
   7. Back and end splashes:
      a. Supplied loose for field installation.
      b. Same material and thickness as worksurfaces.
      c. 4 inches high unless otherwise indicated.

d. Top-mounted end splash where worksurfaces abut adjacent construction at and locations indicated on Drawings.

8. Joints: [As indicated on Drawings.] [Maximum 1/8 inch (2 mm), bonded with epoxy grout.] [__.]
9. Make joints between two benches level.
10. Locate joints away from sinks and over or near supports.
11. Sink cutouts: Routed for drop-in sink.
12. Allowable tolerances:
    a. Square: Plus or minus 1/64 inch (0.4 mm) for each 12 inches (300 mm) of length.
    b. Location of cutouts and drilled openings: Plus or minus 1/8 inch (3 mm) of design dimension.
    c. Size of cutouts and drilled openings: Plus 1/8 inch (3 mm) or minus 0 inches (0 mm).

C. Epoxy Resin Sinks:
1. Mold sinks from thermosetting epoxy resin.
2. Mold interior corners to radius. Slope sink base to drain outlet.
3. Provide 1-1/2 inch (38 mm) outlet with open ended standpipe; standpipe overflow 2 inches (50 mm) shorter than depth of sink.
4. Unless otherwise indicated, fabricate sinks of drop-in design supported by upper flange from worksurface.
5. Color: To match adjacent worksurface.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until cabinets have been installed.

B. Confirm that surfaces to receive tops are plumb and level, with maximum deflection of 1/4 inch (6 mm) in 20 feet (6 m).

3.2 PREPARATION

A. Clean surfaces just prior to installation.

B. Prepare surfaces using methods recommended by manufacturer.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install tops plumb and level.

C. Scribe to adjacent surfaces in accordance with manufacturer's recommendations.

D. Fasten tops to supporting construction with adhesives appropriate for use with adjoining construction and as recommended by manufacturer.

E. Form field joints using manufacturer's recommended adhesive. Form joints to be inconspicuous and nonporous.

F. Install [laboratory shelving] [laboratory fume hood base work surfaces] [pegboards] [reagent racks] using fasteners and adhesive appropriate for use with adjoining construction and as recommendedby manufacturer.

3.4 PROTECTION

A. Protect installed products until completion of Project.

B. Touch up, repair, or replace damaged products.

SECTION 21 0400

GENERAL REQUIREMENTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

A. Section Includes: Every item of labor, materials, equipment and appurtenances for installing complete Fire Suppressions Systems included in Division 21 of the Specifications.

A. The Fire Suppression Drawings are diagrammatic in nature and show the general arrangement of all piping, equipment and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the Drawings, it is not feasible to indicate all offsets, fittings and accessories that may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.

B. Where discrepancies in scope of work as to which Trade provides specific items, such as starters, disconnects, flow switches, electrical control components, etc. exist, such conflicts shall be reported to the Engineer. If such action is not taken, the Contractor, as applicable, shall furnish such items as part of his work, for complete and operable systems and equipment, as determined by the Engineer

1.03 REGULATIONS AND STANDARDS:

A. The completed installation and all materials and equipment shall conform to local ordinances and codes, other regulations and standards listed herein or in related sections. These are intended as a minimum and shall be exceeded if required by the specifications or the Drawings. In the event of conflict between the codes, standards, or regulations, and information contained in the Contract Documents, the applicable code, standards, or regulation shall take precedence.

1.04 INSPECTION CERTIFICATES:

A. The Contractor shall furnish three copies of certificates of final acceptance to the Engineer from all inspection authorities having jurisdiction.

1.05 SUBSTANTIAL COMPLETION INSPECTION :

A. The Engineer will visit the site for the purpose of conducting a substantial completion inspection once the following items have been met by the Contractor:
   1. All fire protection systems shall be complete, operational and under automatic control.
   2. Fire suppression systems cleaning and testing shall be complete and the final report shall be approved by the Engineer

B. All discrepancies noted in the substantial completion report shall be corrected prior to the final inspection. The Contractor shall provide a detailed item-by-item description of all corrections made for each item on the substantial completion discrepancy list prior to scheduling final inspection by the Engineer. Additional visits required after the final inspection, for the reason that previously documented discrepancies had not been corrected at the time of the final inspection, will be made at the Contractor’s expense.

1.06 LEED COMPLIANCE

A. Comply with requirements for LEED certification specified in Division 01.

1.07 ASBESTOS

A. Asbestos Free Materials: The intention of these Drawings and specifications is that there are no asbestos-containing materials installed on this project. To the best of the Architects and Engineers knowledge, none of the material or equipment specified herein or shown on the Drawings contains asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos-containing materials were used for or in the construction of this project.

B. Existing Materials:

1. Contractor shall review the Owners asbestos management plan to ensure suspected asbestos containing materials are under surveillance.
2. Discovery: If during the construction of this project, work involving friable asbestos is suspected, or encountered, all work in this area shall be discontinued and the Owner or the Owner's representative, shall be notified immediately and the Owner with his own forces or by separate contract shall be responsible for complete investigation, removal, and disposition of the friable asbestos hazard in accordance with applicable laws and regulations. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the Contract Documents.
3. Removal: All work involving the removal of friable asbestos will be done under a separate contract.

1.08 MATERIALS AND WORKMANSHIP:

A. Equipment and material used in the project shall be new and undamaged. The fire suppression installation shall fit into the space allotted and shall allow adequate and acceptable clearances for entry, servicing and maintenance. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise. Work shall be performed by mechanics or tradesmen skilled in the trade involved.

B. All piping and equipment shall be installed in a neat and organized manner, parallel to other work and the nearest building elements, unless specifically shown otherwise on the Drawings.

1.09 SUBMITTALS:

A. Submit shop drawings, product data, hydraulic calculations and samples in accordance with Division 01 for all items marked [S] [TD] as specified in related sections of these specifications. Submittals not required by the Contract Documents will not be reviewed. Eight (8) copies of the submittal shall be submitted. Five (5) copies of the submittal will be returned to the Contractor. If additional copies are required, they will be the responsibility of the Contractor. One copy of approved submittals shall be turned over to the Commissioning Agent by the Contractor. If additional copies are required, they will be the responsibility of the Contractor. Where drawings are submitted, Contractor shall submit one (1) reproducible sepia or vellum and three (3) prints. The reproducible and prints will be marked with the Owner, Architect and Engineer each retaining one (1) print for their records. The reproducible will be returned to the Contractor and the Contractor shall be responsible for all additional copies required for his use. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements. Contractor's stamp shall identify the specification section, paragraph and page number for which the submittal is being made. Shop drawings will be reviewed only for general compliance with the Contract Documents. Review will not include correctness of details, proper configuration, utility connections, dimensions, sizes, quantities, and the like. Any submission which has not been reviewed and stamped by the Fire Suppression System Subcontractor will not be reviewed be the Engineer. No reviews prior to award of Contract will be considered or accepted.

NOTE: USE THIS PARAGRAPH FOR ALL CAPITAL OUTLAY PROJECTS

B. Contractor shall bid and install the fire protection system as shown on the construction documents. Deviations in materials, locations, configurations or sizes proposed by the Contractor shall be reviewed under the provisions of Section 26 of the General Conditions as a “Substitution” and are to be to be documented by an approved Change Order.

C. When the Contractor is satisfied that the construction design is complete and code compliant, then the Shop Drawings, Product Data and Calculations shall be submitted to the Architect-Engineer of Record and shall be reviewed and approved before any piping or equipment is installed. Re-submissions of the Shop Drawings, Product Data and Calculations shall include the entire original submittal. **Partial submittals or re-submittals will not be reviewed by the Engineer of Record.**

D. Submissions will be stamped by the Engineer in one of the following ways:

"No Exceptions Taken"	No exceptions are taken and subject to compliance\ with the Contract Documents.
"Make Corrections Noted"	Minor corrections are noted and a re-submittal is not required subject to compliance with the corrections and the Contract Documents.
"Correct and Resubmit "	The submitted material, method or system meets the intent of the specifications, yet has insufficient data to determine compliance with the Contract Documents. Re-submittal is required.
“Rejected”	The submitted material, method or system does not meet the intent of the specifications, or has insufficient data to determine compliance with the Contract Documents

E. Submission Procedures:

1. If a submission is satisfactory to the Engineer, the Engineer will annotate the submission, "No Exceptions Taken" or "Make Corrections Noted" and transmit five (5) copies to the Contractor. If a resubmission is required, the Engineer will annotate the submission “Correct and Resubmit” or "Rejected" and transmit five (5) copies to the Contractor for appropriate action.
2. The Contractor shall revise and resubmit submissions as required by the Engineer until submissions are acceptable to the Engineer.
3. Approval of a working and/or shop drawings by the Engineer will constitute acceptance of the subject matter for which the drawing was submitted and not for any other structure, material, equipment or appurtenances indicated as shown.
4. The Engineer's review of the Contractor's submissions shall in no way relieve the Contractor of any of his responsibilities under the Contract. An approval of a submission shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Documents.
5. Where as-built drawings, record drawings and specifications are available and when provided to the Contractor for use in performing the work, the Contractor shall verify the content of such drawings and specifications, the suitability of their use in performing the work and their accuracy for the purposes in which the Contractor intends to use any record or historical documents which may be obtained. In no case shall the Contractor assume that such documents reflect a true and accurate record of the construction. Acceptance of any such materials, records, and/or drawings shall in no way result in additional cost to the Owner should an error and/or omission in these documents result in additional costs to the Contractor.

6. On the first pages of all submittals, the Contractor shall provide a table showing all individual specification section paragraphs and drawings that apply to the equipment/component and a statement for each paragraph and drawing that the requirements have been met. The table shall be similar in format to the following, but shall include all relevant specification paragraphs and drawings:

Section 21 07 00 (example)	
1.2 A	Comply
1.2 B	Comply
1.3 A	Comply
1.3 B	Comply
1.3 C	Comply
1.4 A	Comply
1.4 A.1	Comply
1.4 A.2	Comply
Drawing M0.01	Comply

G. Equivalents: Manufacturers, trade names, and model numbers indicated herein and on Drawings shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Unless definitely stated otherwise and upon complying with Division 01, the Contractor may use any article which, in his judgment is equal to that specified and is accepted by the Engineer. Manufacturers listed first in these specifications and on Drawings were used as a basis of design. It will be the responsibility of the Contractor to verify all connections, physical sizes, capacities, etc. of all other manufacturer's items, both named and proposed. If the equipment necessitates changes in ductwork, piping, wiring or other building systems from that indicated on the Drawings, the Contractor shall be responsible for all additional costs included and notify other trades. Where such changes are required, detail drawings indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval.

H. Operation and Maintenance manual(s) shall be submitted in according to Division 01, this section; and shall include a complete product index in each volume, installation and maintenance data, parts lists, a copy of all approved shop drawings, product data hydraulic calculations and the name, address and telephone number of supplier or nearest representative. In addition to the above two (2) copies of the latest edition of NFPA No. 25 booklet "Standard for Inspection, Testing and Maintenance of Water Based Fire Protection Systems" shall be turned over to the Owner at the time of his instructions on the operation and maintenance of the Fire Suppression System. All devices, equipment and systems marked [O/M] in these specifications shall be included with all other such items that will require servicing before the duration of its useful life has been reached. Manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.

1.10 WARRANTY:

A. The Contractor shall provide a warranty for a period of one year for all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.

B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.

C. Comply with Division 01 for additional warranty requirements.

D. Information on all warranties shall be included in the O&M Manuals specified herein to be provided to the Owner.

E. In phased construction, warranties shall not begin until substantial completion of the FINAL phase. Contractor shall maintain all new equipment and systems until that time. Owner will maintain all existing equipment and systems. Where new systems are connected to existing, the Contractor and Owner shall determine coordination of maintenance responsibilities at the preconstruction meeting.

1.11 FIRE FLOW TESTS:

A. As soon as practical after award of contract and prior to the preparation of approval or installation drawings, or doing fabrication or installation of any work, the Contractor shall make necessary arrangements to have flow tests made to determine the adequacy of the water supply system. Any revisions or adjustments to systems as indicated on the drawings which are necessitated by the results of the flow test and which changes are required to obtain approval by the Authorities having jurisdiction shall be made subject to Owner's approval and the contract price adjusted accordingly.

1.17 EXISTING UNDERGROUND UTILITIES:

A. The location of underground utilities shown on the Drawings shall be considered approximate, and any locations may not be indicated or known. Care shall be exercised by the Contractor during construction to locate and protect the known and unknown utilities, and to prevent disrupting the affected utility. The Contractor shall be responsible for repairing damage to any utility caused by his work.

B. Where any existing utilities are damaged, they shall be repaired as directed by the Engineer, with materials approved by the local utility company or the Owner, at no additional cost to the Owner.

1.18 INTERRUPTION OF UTILITY SERVICES:

A. It is necessary that close liaison be maintained with the Administrative Authorities in all matters affecting interruptions of any utility services serving the facility and existing buildings. Prior to interrupting any utility service, the Administrative Authorities shall be consulted and interruptions for connections made at a time (or times) suitable to the Administrative Authorities. Work shall be laid out and planned to limit the interruption times to a minimum.

1.19 VERIFYING MEASUREMENTS AND CONDITIONS:

A. The exactness of grades, elevations, dimensions, or locations given on the Drawings, is not guaranteed by the Engineer. The Contractor shall, therefore, satisfy himself as to the accuracy of all grades, elevations, dimensions and locations. In all cases of interconnection of his work with existing or other work, he shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, locations, or dimensions shall be promptly rectified by him without cost to Owner.

B. [**The Contractor shall base his bid on site examinations performed by him. This requirement is mandatory. The Contractor shall visit the site of the proposed project where work is scheduled to be performed, visit the existing buildings scheduled to be renovated, inspect piping systems where new-to-existing connections shall be made, etc., and ascertain for himself the amount of work required to fulfill the intent of his Contract and the complexity of the installation. The Contractor shall not hold the Engineer, his Consultants, agents or employees responsible for or bound by, any**

schedule, estimate or for any plan thereof. The Contractor shall study all Contract Documents to determine exactly the extent of work to be provided under each Section, and in installing new equipment and systems and coordinating the work with the other Trades and existing conditions.]

1.20 COORDINATION OF WORK:

A. General: The Contract Documents indicate the extent and general arrangement of the fire suppression systems. The Contractor shall be responsible for the coordination and proper relation of the fire suppression work to the building structure and to the work of other trades. No additional compensation or extension of completion time will be granted for extra work caused by the lack of coordination.

B. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, the building construction.

C. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the Drawings are intended only as a guide to indicate relative locations of the work. Refer to Architectural and Structural Drawings for building construction details. The Contractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination shall be completed to verify dimensions and characteristics for the installation of each system.

D. Unless necessitated by equipment access or otherwise indicated in the Contract Documents, all equipment, piping, and conduit concealed above ceilings and in finished or utility spaces shall be routed as high as possible.

E. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Fire Suppression System Subcontractor shall provide manual drains as required for his work to affect these offsets, transitions and changes in direction, as applicable.

F. Comply with Division 01 requirements for cutting and patching.

[Cutting and Patching: Unless stated otherwise, the Fire Suppression Trade shall do all cutting necessary for the installation of his work. All work should be installed sufficiently in advance of new construction in order to permit installation of supports, sleeves, and similar items without cutting. Patching and repair work shall exactly match new and existing adjacent work in all respects and shall not be obvious the Architect-Engineer. The Fire Suppression Trade is responsible for patching where he does cutting. Patching shall be done to the satisfaction of the Architect-Engineer.]

G. Roughing-In: Verify the locations of machines, door swings, block coursing, alignment of tile end and other similar features before roughing-in.

H. Fire Suppression System piping shall be concealed except in rooms or spaces without ceilings, and the equipment rooms and as indicated otherwise. Sprinkler heads in ceilings shall be located as shown on the drawings. The Fire Suppression System Subcontractor shall give due consideration to minimize conflicts, and coordinate, with other trades as to location of equipment, piping, conduits, ductwork, grilles, diffusers, electrical switchgear, panelboards, light fixtures, etc. Full access and clearance requirements around equipment of all other trades shall be maintained.

I. Unless otherwise indicated, fire suppression piping in spaces with no ceilings shall be run tight to decking and corners. Where possible, piping shall be concealed behind walls, chases, soffits, and above ceilings. Piping exposed in areas with sloped roof decking shall follow the slope of the decking.

J. Damage to Other Work: Each Contractor is responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Subcontractor who

installed the work, and as directed by the Architect-Engineer; the cost of which shall be paid for by the Subcontractor responsible for the damage.

1.21 EQUIPMENT INSTALLATION:

A. General: Equipment shall be installed in accordance with manufacturer's instructions to conform to the details and application indicated.

B Supports: Provide necessary supports for all equipment and appurtenances as required; this includes but is not limited to frames or supports for items such as tanks, air compressors, pumps, valves and other similar items requiring supports. Floor mounted equipment in Equipment Rooms shall be set on 4-inch high concrete foundation pads unless shown otherwise. All pads shall be poured such that the top of the pad is level. Foundation drawings, bolt setting information and foundation bolts shall be furnished by the equipment suppliers furnishing the equipment for all equipment required to have concrete foundations. Concrete for foundations shall be provided by the Fire Suppression System Subcontractor unless indicated otherwise. Except where indicated, all equipment shall be anchored to concrete pads.

C. Service Area: All equipment and appurtenances shall be located to permit adequate service clearance in accordance with manufacturer's recommendations and as otherwise required. Service clearance shall include but not be limited to adequate space for inspection, servicing, testing and removal of Fire Protection System including motors, controls and equipment. All piping and other equipment shall be located outside of the service area or shall be flanged for easy removal to facilitate equipment service. All equipment shall be located with sufficient distance from building features, structural components, and the equipment of other trades. Service clearance in front of electrical panels shall be the minimum as required by National Electric Code (NEC) where applicable.

D. Temporary Requirements: Openings in equipment shall be kept plugged at all times until connection is made to the system. The ends of all pipes and equipment openings shall be kept plugged or capped properly with approved devices. Approved devices are items such as specially molded plastic caps, pipe plugs, test plugs and sheet metal caps.

1.22 SLEEVES AND INSERTS:

A. General: Sleeves and inserts shall be provided and correctly located in the structure, as require for the work.

B. Inserts shall be steel and proper size for loads encountered.

C. Sleeves shall be provided for all pipes passing through concrete or masonry walls, partitions, concrete slabs installed during construction of the wall, partition or slab. Sleeves through existing concrete walls and slabs may be omitted if wall or slab can be core drilled and properly sealed in a manner acceptable to the Engineer. Sleeves placed horizontally in walls placed vertically in non-waterproof floors shall be 20 gauge galvanized sheet steel of length equal to thickness of slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. Sleeves occurring in floors of rooms where hose bibs or floor drains occur, and in pipe spaces, shall be standard weight steel pipe projecting 2" above the finished floor except in Equipment Rooms they shall project four (4) inches above floor. Sleeves in floors with waterproof membrane shall be provided with flanges or flashing rings and shall be clamped or flashed into membrane. All sleeves and core drilled openings shall be of sufficient diameter to clear bare or covered pipes by 1/4" all around except sleeves on lines subject to movement by expansion which shall clear the bare pipe or insulation on insulated pipe at least one inch all around. Pipes through exterior walls below grade and above footings shall be installed in sleeves having a minimum size of two larger pipe diameters and sealed watertight with flexible synthetic rubber seals. Sleeve shall have anchor and water stop plate. The entire assembly shall be tightened and adjusted and made watertight. Sleeves for pipes and conduit, penetrating fire (and smoke) rated partitions, walls and floors shall be sealed in accordance with the terms of U.L. Listed Through-Penetration Firestop Systems XHEZ as published in the U.L. Fire Resistance Directory.

Penetrations shall exactly conform to details of the Firestop System indicated for the type of partition, wall and floor construction encountered. All penetrations through nonfireresistance rated floor assemblies and through the ceiling membrane of nonfireresistance rated roof assemblies shall be fireblocked with tightly packed mineral-wool insulation secured in place. All penetrations through equipment room walls and other areas of noise or heat generation shall be tightly sealed with mineral fiber rope. All penetrations through draftstop partitions shall be sealed to maintain the integrity of the partition. All firestopping and draftstopping of sleeves for fire suppression work shall be provided under Division 21.

1.23 ESCUTCHEONS:

A. Where pipes pass through floors, walls or ceilings in finished rooms, they shall be fitted with chromium plated escutcheons of suitable pattern to effectively cover the rough opening. Where sleeves project above floors, special deep type escutcheons shall be provided.

1.24 ACCESS DOORS:

A. Provide for all concealed valves or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for fire suppression work shall be furnished as a part of this Division 21 to the General Contractor for installation. The Fire Suppression Subontractor shall provide locations of all access doors such that service may be safely performed from a ladder, lift, or platform without the need for support from the ceiling system. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction. Doors occurring in rated construction shall be fire rated U.L. labeled access doors correlated to preserve the integrity of the rated construction. Doors shall be prime finish steel except those in toilets, shower rooms, locker rooms, kitchens and other similar areas shall be stainless steel with brushed finish.

1.25 ELECTRICAL WIRING AND EQUIPMENT:

A

D. Wiring, low voltage (100 volts or less) control wiring shall be provided as a part of Section 28 31 00 “Fire Detection and Alarm”. Verify that wiring of all motors and controls required by equipment furnished is accomplished for the correct sequence of operation.

E. Comply with Division 26 requirements for wiring, line voltage (101 volts or higher) power or control wiring. Items shall be provided under Division 26.

F. Disconnects shall be provided for each item of equipment under Division 26, unless specified otherwise in other sections.

G. Miscellaneous manual or automatic control and protective or signal devices required for the sequence of operation indicated for fire suppression equipment shall be provided under the section of the specifications where the item of equipment is specified unless indicated otherwise.

1.26 PROTECTION FROM MOVING PARTS:

A. Belts, pulleys, chains, gears, shafts, couplings and other rotating or moving parts located so that any person may come in close proximity thereto shall be fully enclosed or properly guarded.

1.27 MARKING AND DESIGNATION OF EQUIPMENT:

A. After all other painting is completed, operating and control parts of the equipment and systems such as valves disconnect switches, motor starters and control devices shall be properly marked. Valve markers shall be metal tags with designations stamped thereon, securely chained to the respective valve. Starters disconnect switches and pneumatic or electric control instruments shall be marked with laminated engraved plastic nameplates fastened with sheet metal screws, bolts or permanent adhesive. Pressure sensitive tape is not acceptable. Identification symbols or designations shall be the same as shown on the Contract Documents.

1.28 RECORD OF UNDERGROUND LINES:

A. On completion of the project, the Contractor shall prepare and submit to the Engineer a drawing on tracing paper and one blue line print to show the location of any underground lines installed in locations different from those on the Architect-Engineer's Drawings.

1.29 CHARTS AND DIAGRAMS:

A.. General: Material as listed below shall be provided by the Contractor and shall be mounted in separate hardwood frames where directed in the field or folded and stored in a plastic document folder and located in the control cabinets. All charts, diagrams and schemes shall be photographic positives prepared from original tracings. A copy of charts and diagrams shall be included with O/M manuals.

B. Charts for identification of valves.

1.30 INSTRUCTION OF OWNER'S REPRESENTATIVE:

A. Contractors shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the Fire Suppression systems. Competent representatives of the Contractor shall spend such time as necessary to fully prepare the Owner to operate and maintain the Mechanical and Electrical systems.

1.31 CONSTRUCTION STATUS REPORT:

A. Each item of discrepancies noted on Construction Status Report prepared by the Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

1.32 GRAPHICS DATABASE:

A. This project's Computer Aided Design & Drafting (CADD) drawing files may be obtained from the Engineer for use in preparing computer graphics specific to this project. Refer to Division 1. [**Refer to Appendix A at the end of this Section for letter of Indemnification and ordering instructions].**

1.33 DEMOLITION

A. Contractor shall visit site before bidding to determine extent of demolition.

B. Removal of Sprinklers, Piping and Equipment: Remove all sprinkler and piping connections, plugging outlets, etc., such that are not required for present equipment and fixtures, or are not reused or needed for reconnecting new equipment and fixtures. Remove all equipment, fixtures, etc., indicated to be removed, or not reused or needed after the renovations are complete.

C. Where piping, conduit or other similar items passing through rated assemblies are removed; the assemblies shall be patched in accordance with UL so as to maintain the integrity of the assembly.

D. The Owner will select and retain such existing equipment and materials which are indicated to be removed and not reused, as he desires. All other existing equipment and materials indicated to be removed and not reused shall become the property of the Contractor, who shall promptly remove them from the premises. All existing equipment and fixtures indicated to be relocated

shall be disconnected, removed, relocated and reconnected. All equipment and fixtures shall be protected from damage during demolition.

E. Miscellaneous: In all altered portions of the buildings, the Contractor shall remove or alter as necessary all existing fire suppression work that is not coordinated to operate with the new construction. Demolition shall not begin until the work schedule is approved by the owner. The work shall be scheduled to prevent any disruption to the normal operations of the building.

F. General Scope of Demolition:)

1.36 TEMPORARY FIRE PROTECTION:

A. Provide all piping and accessories including temporary piping equipment to provide and maintain system operation during construction as required by the building code.

1.37 LIMITS OF CONTRACT:

A. Fire Main piping shall be extended under this section of the specifications to a point 5'-0" beyond the building line, unless otherwise indicated on the drawings, where the pipes shall be capped or plugged with location identified and left ready for connection and extension included under Division 33 Utilities.

1.38 TESTING OF WORK:

A. Partial Testing: As much as practical, systems shall be tested as complete systems. Tests on portions of a system will be permitted to facilitate proper progress scheduling. When systems are tested in segments, a system diagram indicating portion tested and a separate and complete report including the date of test is required for each segment.

B. Concealed Work:

1. All concealed work shall be tested and approved by the Architect/Engineer prior to the application of insulation or construction of chase walls.
2. Covering shall not be applied to any piping nor shall any piping be concealed or covered until pipes have been tested, all leaks stopped, retested and approved

C. Fire Suppression System Testing:

1. Perform and pay for all tests as may be required in the applicable NFPA Standards and as specified herein and as may be required by Authorities having jurisdiction. Any defects shall be corrected to the satisfaction of the Authorities having jurisdiction and the Architect-Engineer.
2. The entire Fire Protection System shall be tested according to NFPA-13 Chapter 24 “Systems Acceptance”
3. After the Contractor has satisfied himself that the Fire Suppression System is complete and properly serviceable in all respects, he shall arrange with the Authorities having jurisdiction and the Architect-Engineer for a final test and inspection as applicable.
4. The final tests and inspections shall be made by a representative of the Authorities having jurisdiction, who must be satisfied with the entire installation before final acceptance by the Architect-Engineer.
5. For the **[Sprinkler] [Fire Suppression]** System, the Contractor shall furnish the Architect-Engineer with two copies of complete NFPA 13- **[and] [NFPA-14]** Form “Contractor’s Material and Test Certificate or Aboveground Piping”.

D. Backflow Preventers:

1. Inspect and test after initial installation using testing procedures in accordance with the manufacturers printed instructions. Test shall be performed by a Backflow Prevention Mechanic certified by a Texas Department of Health approved school.
2. Test results shall be recorded on forms approved or provided by_____ .

1.39 COMMISSIONING OF FIRE SUPPRESSION SYSTEMS:

A. Comply with Section 01 91 13, General Commissioning Requirements, for systems to be commissioned and responsibilities for commissioning.

B. All prefunctional testing and startups for each component of a system shall be successfully completed by the Subcontractor responsible for the purchase of the equipment or system and shall be conducted prior to formal functional performance testing (FPT) of equipment or subsystems of the given system.

C. The Contactor and each Subcontractor shall provide skilled tradesmen/technicians, with specific knowledge of the equipment and systems installed on this project, to provide and support the functional performance testing of individual systems as outlined in Section 01 91 13.

PART 2 - PRODUCTS

2.1 PAINTING:

A. Acceptable manufacturers: Except as otherwise specified, materials shall be the products of the following manufacturers:

Sherwin-Williams

Pratt and Lambert

Pittsburgh Paints (PPG)

Benjamin Moore

Porter Paints

Seton Identification Products

B. Materials:

1. Deliver all paints and materials to the project site in their unopened original containers with all labels intact and legible at the time of use.
2. For adhesives and sealants applied within the building waterproofing envelope, comply with low emitting requirements in Division 01section”Indoor Air Quality Requirements.”
3. All coatings exposed to supply and return airstreams and where applied to exposed surfaces in a return air plenum, shall have a composite flame spread rating not exceeding 25, and a smoke developed rating not exceeding 50 as tested under procedure ASTM E-84-75, NFPA 255 and UL 723. Coatings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411, latest edition.
4. Sherwin-Williams Industrial Maintenance Coatings System 4000 products are listed below to establish color and a standard of quality.
   a. All Hangers and Supports: One coat Pro–Industrial Zero VOC Acrylic Gloss Black.
   b. Piping: Exposed in equipment rooms and where connections are made to equipment located in storage rooms and other utility type areas.
      (1) Priming:
         a) Bare Iron or Steel or Copper: One coat Pro-Cryl Primer (1000g/L).
         b) Galvanized Steel: Pipes shall be chemically prepared and primed with one coat of Pro-Cryl B66-310 Primer.
      (2) Finish: All pipe lines and the supports or hangers therefore, shall be finished with Pro–Industrial Zero VOC Acrylic Gloss, gray No. SW4028 Gypsum applied in sufficient number of coats to effectively cover the prime coat. Painting of pipe hangers is specified hereinbefore.
      (3) Materials shall be as recommended by the manufacturer for the surface to be finished.
      (4) Unless otherwise specified, primer shall be by the same manufacturer as the finish coat.

(5) Materials shall not be thinned or cut except as recommended by the coating manufacturer. Thinners shall be by the same manufacturer as the primer and finish coat.
(6) Sprinkler heads and all associated fire protection sensors and controllers shall not be painted.
(7) Fire Suppression System piping shall not be painted until fire suppression system testing is complete and accepted by the authorities having jurisdiction

PART 3 - EXECUTION:

3.01 PAINTING:

A. Workmanship: The work shall be accomplished by qualified mechanics skilled in the painting trade. Painting of equipment, piping and other materials shall not commence until all testing is complete and systems are ready for operation. Materials shall be applied according to manufacturer's directions. All containers shall be securely closed when not in use. Flammable materials shall not be stored on premises. Flammable waste shall be disposed of daily in devices approved for such purposes. Materials shall be evenly spread, and smoothly flowed on without runs or sags. Each coat shall be thoroughly dry before application of succeeding coats.

B. Protection of Work: The painters shall protect all adjacent surfaces with drop covers during the process of painting. Upon completion, paint spots, if any, shall be removed from all surfaces. Sprinkler heads shall not be painted.

C. Preparation of Surface: Surfaces to be painted shall be completely dry before applying paint. Metal surfaces shall be cleaned with mineral spirits before applying materials. Rust and scale shall be removed by wire brushing or sanding. Galvanized surfaces shall be chemically pretreated with crystalline (zinc phosphate) phosphate in strict accordance with the manufacturer's recommendations. Surfaces shall not be painted when the temperature is, or is likely to be, near the freezing point, or when they are exposed to hot sun.

3.02 IDENTIFICATION OF PIPES AND EQUIPMENT:

A. Equipment: After all other painting is completed; each major item of equipment shall be properly identified with laminated engraved plastic nameplates fastened with sheet metal screws, bolts or permanent adhesive. Identification symbols and designations shall be the same as shown on the Contract Documents. Where equipment or valves are installed above lay-in ceilings the plastic nameplate shall be adhered to the face of the T-bar support so that it can be identified from within the space.

B. Piping: All piping shall be identified with Seton Ultra-Mark or equal wrap around piping system markers and arrow flow directional marker. Markers shall be pre-coiled, semi-rigid plastic or polyester with sealed color graphics. Markers shall be minimum 12 inches long with 1-¼ inch high letters, formed to cover entire circumference of the pipe. Markers shall be attached to piping using plastic tie wraps. Pipe identification shall use the same designations or abbreviations used on the drawings. Marker colors shall be in accordance with ANSI.

C. Apply piping system markers after completion of required finishes on piping systems. Markers shall be applied in the following locations and where identified by the Engineer:
1. At each valve and at connection to equipment.
2. At every tee and branch connection.
3. At each riser including branch risers from mains.
4. At each side of a pipe passage through floors, walls and partitions.
5. Every 15 feet on straight runs of piping mains and branches.
6. Within 6 feet of elbows (each side).
7. At access doors or similar points that permit view of concealed piping.
8. Markers shall be provided on all piping above lay-in ceilings.
9. Provide arrow markers showing direction of flow incorporated into, or adjacent to, each piping system marker.

10. Apply all piping system markers where view is unobstructed, and legends can be read and easily identified.
11. Apply all tags and piping system markers in accordance with the supplier's instructions.

END OF SECTION

APPENDIX A
LETTER OF INDEMNIFICATION

Project Name:

Project Location:

At the Contractors request, Stratus will provide electronic files of the Revit Models for their convenience and use, subject to the following terms and conditions:

Stratus electronic files are compatible with Autodesk Revit Product version for which they were designed. Autocad files will be provided in the Autocad 2018 DWG format. Stratus makes no representation as to the compatibility of these files with your hardware or your software.

Data contained on these electronic files is part of Stratus's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of project layout for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to Stratus. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Stratus, its officers, directors, employees, agents, or subconsultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless Stratus from all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to Addenda, Change Orders, or other revisions. Stratus makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed documents prepared by Stratus and the electronic files, the signed Contract Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm, and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

The use of the Revit Model files prepared by the Engineer shall not in any way negate the Contractor's responsibility for coordination with other trades or for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

All information added to the drawings by the Contractor shall be in a distinctively heavier pen weight and different font, such that all Contractor information can be clearly distinguished from the original files.

Any information added by the Contractor, which represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, Stratus reserves the right to remove all indicia of its ownership and/or involvement for each electronic display.

Under no circumstances shall delivery of the electronic files for use by you deemed a sale by Stratus, and Stratus makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall Stratus be liable for any loss of profit or any consequential damages.

The Engineer believes that no licensing or copyright fees are due to others on account of the transfer of the Revit Model files, but to the extent any are, the Contractor will pay the appropriate fees and hold the Engineer harmless from such claims as may arise.

Any purchase order number provided by the Contractor is for the Contractor's accounting purposes only. The Contractor's purchase order terms and conditions are void and are not a part of this agreement.

The Recipient further agrees that the drawing files will only be used in graphics preparation for the above-referenced project.

Company Name of Recipient: _____

Recipient's Designated Representative: _____

Title: _____

Signature: _____

Address: _____

Return to: Stratus
5228 Valleypointe Parkway, Suite 4
Roanoke, VA 24019
Stratus # 2026-0302

SECTION 21 1313

WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Pipes, fittings, and specialties.
   2. Sprinklers.

1.03 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.04 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.05 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
   1. Fire Flow Tests: Comply with requirements for Fire Flow Tests specified in Section 21 04 00 “General Requirements for Fire Suppression
   2. The Authorities having jurisdiction shall include the Seagoville Fire Marshal’s Office and other local Administrative Representatives.
   3. Margin of Safety for Available Water Flow and Pressure: 5 psig, including losses through water-service piping, valves, and backflow preventers.
   4. Sprinkler Occupancy Hazard Classifications:
      a. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
      b. General Storage Areas: Ordinary Hazard, Group 1.
      c. Office, Classrooms and Public Areas: Light Hazard.
   5. Minimum Density for Automatic-Sprinkler Piping Design:
      a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft.
      b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft.
   6. Maximum Protection Area per Sprinkler:
      a. Office Spaces and Classrooms: 225 sq. ft.
      b. Storage Areas: 130 sq. ft.
      c. Mechanical Equipment Rooms: 130 sq. ft.
      d. Electrical Equipment Rooms: 130 sq. ft.
      e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
   7. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
      a. Light-Hazard Occupancies: 100 gpm for 30 minutes
      b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes

1.06 SUBMITTALS

A. Submittal data is required for items in this Section and as specified in Division 01 and Section 210400 “General Requirements for Fire Suppression**s**

B. Product Data: For each type of product indicated [S]**.** Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Comply with requirements in Division 01 and Section 210400 “General Requirements for Fire Suppression”.

C. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.

D. Hydraulic Calculations: Include Hydraulic Calculations for each remote area.

E. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified design professional responsible for their preparation.

F. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are and coordinated with each other, using input from installers of the items involved:

1. Plumbing piping.
2. HVAC Equipment, Ductwork and hydronic piping.
3. Items penetrating finished ceiling include the following:
    a. Lighting fixtures.
    b. Ceiling diffusers and grilles.
    c. Exit Signs.
    d. Heat and Smoke Detectors, Speakers, Projectors, Motion Sensors
4. Electric Switchgear, panelboards

G. Qualification Data: For qualified Installer.

H. Approved Sprinkler Piping Drawings: Working plans, prepared according to The International Fire Code (IFC) and NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

I. Fire-hydrant flow test report.

J. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping." Comply with requirements in Section 210400 ‘General Requirements for Fire Suppression”.

K. Field quality-control reports.

L. Operation and Maintenance Data: For sprinkler specialties indicated [O/M], to include in emergency, operation, and maintenance manuals. Comply with requirements in Division 01 and Section 210400 “General Requirements for Fire Suppression”.

1.07 APPROVAL DRAWINGS AND CALCULATIONS

A. Before any piping or equipment is installed, this Contractor shall submit appropriate drawings, calculations and equipment specifications to the Authorities having jurisdiction and obtain their approval. A copy of the Authorities’ letter of approval shall be furnished, along with submittals, to the Architect-Engineer and the Owner. All work shall be subject to installation, testing and inspection requirements of the Authorities having jurisdiction.

1.08 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
   1. NFPA 13, "Installation of Sprinkler Systems."
   2. The International Fire Code (IFC)

1.09 PROJECT CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
   1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of sprinkler service.
   2. Do not proceed with interruption of sprinkler service without Architect's and Owner's written permission.

1.10 COORDINATION

A. Coordinate layout and installation of fire suppression system with other construction. Comply with requirements in Section 21 04 00 "General Requirements for Fire Suppression".

1.11 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Sprinkler Cabinets [s]: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes. **All pipe and fittings shall have a minimum corrosion resistance ratio (CRR) of 1.0. Submit printed data from pipe manufacturer certifying materials meet this requirement.**

2.02 STEEL PIPE AND FITTINGS [S]

A. Schedule 40, Black-Steel Pipe: ASTM A 135 or ASTM A 795. Pipe ends may be factory or field formed to match joining method.
   1. Pipe larger than 2-1/2 inch to be welded or rolled groove.
   2. Pipe smaller than 2-1/2 inch to have malleable iron threaded or rolled groove fittings.

B. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, standard-weight, seamless steel pipe with threaded ends.

C. Uncoated, Steel Couplings: ASTM A 865, threaded.

D. Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

E. Malleable- or Ductile-Iron Unions: UL 860.

F. Cast-Iron Flanges: ASME 16.1, Class 125.

G. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

H. Steel Welding Fittings: ASTM A 234 and ASME B16.9.

I. Grooved-Joint, Steel-Pipe Appurtenances:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Anvil International, Inc.
      b. Corcoran Piping System Co.
      c. National Fittings, Inc.
      d. Shurjoint Piping Products.
      e. Tyco Fire & Building Products LP.
      f. Victaulic Company.
   2. Pressure Rating: 175 psig minimum.
   3. Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
   4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts. Fittings in paragraph below are available in NPS 3/4 to NPS 2 (DN 20 to DN 50).

2.03 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick.
   1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
   2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Welding Filler Metals: Comply with AWS D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.04 LISTED FIRE-PROTECTION VALVES [S]

A. General Requirements:
   1. Valves shall be UL listed or FM approved.
   2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig

B. Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Anvil International, Inc.
      b. Victaulic Company.
   2. Standard: UL 1091 except with ball instead of disc.
   3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
   4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
   5. Valves NPS 3: Ductile-iron body with grooved ends.

C. Bronze Butterfly Valves:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Fivalco Inc.
      b. Global Safety Products, Inc.
      c. Milwaukee Valve Company.
   2. Standard: UL 1091.
   3. Pressure Rating: 175 psig.
   4. Body Material: Bronze.
   5. End Connections: Threaded.

D. Iron Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Anvil International, Inc.
    b. Fivalco Inc.
    c. Global Safety Products, Inc.
    d. Kennedy Valve; a division of McWane, Inc.
    e. Milwaukee Valve Company.
    f. NIBCO INC.
    g. Pratt, Henry Company.
    h. Shurjoint Piping Products.
    i. Tyco Fire & Building Products LP.
    j. Victaulic Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig
4. Body Material: Cast or ductile iron.
5. Style: Lug or wafer.
6. End Connections: Grooved.

E. Check Valves:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Anvil International, Inc.
    b. Fivalco Inc.
    c. Globe Fire Sprinkler Corporation.
    d. Kennedy Valve; a division of McWane, Inc.
    e. Milwaukee Valve Company.
    f. Mueller Co.; Water Products Division.
    g. NIBCO INC.
    h. Potter Roemer.
    i. Reliable Automatic Sprinkler Co., Inc.
    j. Tyco Fire & Building Products LP.
    k. United Brass Works, Inc.
    l. Victaulic Company.
    m. Viking Corporation.
2. Standard: UL 312.
3. Pressure Rating: 250 psig minimum
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

F. Bronze OS&Y Gate Valves:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Crane Co.; Crane Valve Group; Crane Valves.
    b. Crane Co.; Crane Valve Group; Stockham Division.
    c. Milwaukee Valve Company.
    d. NIBCO INC.
    e. United Brass Works, Inc.
2. Standard: UL 262.
3. Pressure Rating: 175 psig.
4. Body Material: Bronze.
5. End Connections: Threaded.

G. Iron OS&Y Gate Valves:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. American Cast Iron Pipe Company; Waterous Company Subsidiary.

b. American Valve, Inc.
c. Clow Valve Company; a division of McWane, Inc.
d. Crane Co.; Crane Valve Group; Crane Valves.
e. Crane Co.; Crane Valve Group; Jenkins Valves.
f. Crane Co.; Crane Valve Group; Stockham Division.
g. Hammond Valve.
h. Milwaukee Valve Company.
i. Mueller Co.; Water Products Division.
j. NIBCO INC.
k. Shurjoint Piping Products.
l. Tyco Fire & Building Products LP.
m. United Brass Works, Inc.
n. Watts Water Technologies, Inc.

2. Standard: UL 262.
3. Pressure Rating: 250 psig minimum
4. Body Material: Cast or ductile iron.
5. End Connections: Flanged or grooved.

H. NRS Gate Valves:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
   b. American Valve, Inc.
   c. Clow Valve Company; a division of McWane, Inc.
   d. Crane Co.; Crane Valve Group; Stockham Division.
   e. Kennedy Valve; a division of McWane, Inc.
   f. Mueller Co.; Water Products Division.
   g. NIBCO INC.
   h. Tyco Fire & Building Products LP.
2. Standard: UL 262.
3. Pressure Rating: 250 psig minimum
4. Body Material: Cast iron with indicator post flange.
5. Stem: Nonrising.
6. End Connections: Flanged or grooved.

2.05 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.

B. Angle Valves:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fire Protection Products, Inc.
   b. United Brass Works, Inc.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Affiliated Distributors.
   b. Anvil International, Inc.
   c. Barnett.
   d. Conbraco Industries, Inc.; Apollo Valves.
   e. Fire-End & Croker Corporation.
   f. Fire Protection Products, Inc.
   g. Flowserve.

h. FNW.
i. Jomar International, Ltd.
j. Kennedy Valve; a division of McWane, Inc.
k. Kitz Corporation.
l. Legend Valve.
m. Metso Automation USA Inc.
n. Milwaukee Valve Company.
o. NIBCO INC.
p. Potter Roemer.
q. Red-White Valve Corporation.
r. Southern Manufacturing Group.
s. Stewart, M. A. and Sons Ltd.
t. Tyco Fire & Building Products LP.
u. Victaulic Company.
v. Watts Water Technologies, Inc.

D. Globe Valves:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Fire Protection Products, Inc.
b. United Brass Works, Inc.

2.06 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Anvil International, Inc.
b. National Fittings, Inc.
c. Shurjoint Piping Products.
d. Tyco Fire & Building Products LP.
e. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 300 psig.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-T and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:[S]
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. AGF Manufacturing Inc.
b. Reliable Automatic Sprinkler Co., Inc.
c. Tyco Fire & Building Products LP.
d. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 300 psig.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

C. Branch Line Testers:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following.

a. Elkhart Brass Mfg. Company, Inc.
b. Fire-End & Croker Corporation.
c. Potter Roemer.

2. Standard: UL 199.
3. Pressure Rating: 175 psig.
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AGF Manufacturing Inc.
   b. Triple R Specialty.
   c. Tyco Fire & Building Products LP.
   d. Victaulic Company.
   e. Viking Corporation.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 300 psig.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. CECA, LLC.
   b. Corcoran Piping System Co.
   c. Merit Manufacturing; a division of Anvil International, Inc.
2. Standard: UL 1474.
3. Pressure Rating: 300 psig
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

F. Flexible, Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fivalco Inc.
   b. FlexHead Industries, Inc.
   c. Gateway Tubing, Inc.
   d. Victaulic Company
2. Standard: UL 1474.
3. Type: Braided Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 175 psig minimum
5. Size: Same as connected piping, for sprinkler.

2.07 SPRINKLERS [S]

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AFAC Inc.
2. Globe Fire Sprinkler Corporation.

3. Reliable Automatic Sprinkler Co., Inc.
4. Tyco Fire & Building Products LP.
5. Venus Fire Protection Ltd.
6. Victaulic Company.
7. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Sprinkler Finishes:

1. Chrome plated.

D. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, two piece, with 1-inch vertical adjustment.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.02 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install unions adjacent to each valve in pipes NPS 2 and smaller.

E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

G. Install sprinkler piping with drains for complete system drainage.

H. Install alarm devices in piping systems.

I. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

J. Fill sprinkler system piping with water.

K. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves in Section 210400 “General Requirements” for Fire-Suppression."

L. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons in Section 210400 “General Requirements for Fire-Suppression."

3.03 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Welded Joints: Construct joints according to AWS D10.12M, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shopweld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.04 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

3.05 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

B. In areas without ceilings, sprinkler heads to be upright type.

C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

3.06 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping. Comply with requirements in NFPA 13 and Section 210400 “General Requirements for Fire Suppression”.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.07 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Coordinate with fire-pump tests. Operate as required.
7. Verify that equipment hose threads are same as local fire-department equipment.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.08 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

3.09 PIPING SCHEDULE

A. Standard-pressure, wet-pipe sprinkler system, NPS 2 ½ inch and smaller shall be the following:

1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Schedule 40, black-steel pipe with roll-grooved ends; grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

B. Standard-pressure, wet-pipe sprinkler system, NPS 2 ½ inch and larger, shall be the following:

1. Schedule 40, black-steel pipe with roll-grooved ends; grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
2. Schedule 40, black-steel pipe with plain ends; welding fittings; and welded joints.

3.10 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright Sprinklers.
2. Rooms with Suspended Ceilings: Sprinkler heads to be fully concealed similar to Reliable model G1 with chrome cover plate.
3. Wall Mounting: When necessary to avoid conflicts with distribution room equipment, wall-mounted, side discharge sprinkler heads with wire baskets are allowed.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with chrome plate.
2. Upright Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION

SECTION 22 0400

GENERAL REQUIREMENTS FOR PLUMBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes: Every item of labor, materials, equipment and appurtenances for installing Plumbing Systems included in Division 22 of the Specifications.

1.03 DRAWINGS

A. The Plumbing Drawings are diagrammatic in nature and show the general arrangement of all piping, equipment and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the Plumbing Drawings, it is not feasible to indicate all offsets, fittings and accessories that may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.

B. Where discrepancies in scope of work as to which Trade provides specific items, such as starters, disconnects, flow switches, electrical control components, etc. exist, such conflicts shall be reported to the Engineer. If such action is not taken, the Contractor, as applicable, shall furnish such items as part of his work, for complete and operable systems and equipment, as determined by the Engineer.

1.04 REGULATIONS AND STANDARDS

A. The completed installation and all materials and equipment shall conform to local ordinances and codes, other regulations and standards listed herein or in related sections. These are intended as a minimum and shall be exceeded if required by the specifications or the Drawings. In the event of conflict between the codes, standards, or regulations, and information contained in the Contract Documents, the applicable code, standards, or regulation shall take precedence.

1.05 LIMITS OF CONTRACT:

A. Sanitary Sewer, Storm Sewer and Water Service piping shall be extended under this section of the specifications to a point 5'-0" beyond the building line, unless otherwise indicated on the drawings, where the pipes shall be capped or plugged with location identified and left ready for connection and extension included under Division 33 Utilities.

1.06 INSPECTION CERTIFICATES

A. The Contractor shall furnish three copies of certificates of final acceptance to the Engineer from all inspection authorities having jurisdiction.

1.07 SUBSTANTIAL COMPLETION INSPECTION

A. The Engineer will visit the site for the purpose of conducting a substantial completion inspection once the following items have been met by the Contractor:
   1. All Plumbing systems shall be complete, operational and under automatic control.
   2. Plumbing systems cleaning, balancing, and testing shall be complete and the final report shall be approved by the Engineer.

B. All discrepancies noted in the substantial completion report shall be corrected prior to the final inspection. The Contractor shall provide a detailed item-by-item description of all corrections

made for each item on the substantial completion discrepancy list prior to scheduling final inspection by the Engineer. Additional visits required after the final inspection, for the reason that previously documented discrepancies had not been corrected at the time of the final inspection, will be made at the Contractor's expense.

1.08 LEED COMPLIANCE

A. Comply with requirements for LEED certification specified in Division 01.

1.09 ASBESTOS

A. Asbestos Free Materials: The intention of these Drawings and specifications is that there are no asbestos-containing materials installed on this project. To the best of the Architects and Engineers knowledge, none of the material or equipment specified herein or shown on the Drawings contains asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos-containing materials were used for or in the construction of this project.

B. Existing Materials:

1. Contractor shall review the Owners asbestos management plan to ensure suspected asbestos containing materials are under surveillance.
2. Discovery: If during the construction of this project, work involving friable asbestos is suspected, or encountered, all work in this area shall be discontinued and the Owner or the Owner's representative, shall be notified immediately and the Owner with his own forces or by separate contract shall be responsible for complete investigation, removal, and disposition of the friable asbestos hazard in accordance with applicable laws and regulations. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the Contract Documents.
3. Removal: All work involving the removal of friable asbestos will be done under a separate contract.

1.10 MATERIALS AND WORKMANSHIP

A. Equipment and material used in the project shall be new and undamaged. The Plumbing installation shall fit into the space allotted and shall allow adequate and acceptable clearances for entry, servicing and maintenance. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise. Work shall be performed by mechanics or tradesmen skilled in the trade involved.

B. All piping and equipment shall be installed in a neat and organized manner, parallel to other work and the nearest building elements, unless specifically shown otherwise on the Drawings.

C. Equipment and materials shall be suitable for use in the environment in which they are installed. Equipment exposed to outside conditions shall be adequately protected from the weather, manufactured from materials suitable for outdoor use, and designed specifically for use in outdoor environments.

1.11 SUBMITTALS

A. Submit shop drawings, product data and samples in accordance with Division 01 for all items as specified in related sections of these specifications. Eight (8) copies of the submittal shall be submitted. Five (5) copies of the submittal will be returned to the Contractor. If additional copies are required, they will be the responsibility of the Contractor. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements. Contractor's stamp shall identify the specification section, paragraph and page number for

which the submittal is being made. Shop drawings will be reviewed only for general compliance with the Contract Documents. Review will not include correctness of details, proper configuration, utility connections, dimensions, sizes, quantities, and the like. Any submission which has not been reviewed and stamped by the Plumbing Subcontractor will not be reviewed be the Engineer. No reviews prior to award of Contract will be considered or accepted. Re-submissions of shop drawings, product data and samples shall include the entire original submittal. **Partial submittals will not be reviewed by the Engineer.**

B. Submissions will be stamped by the Engineer in one of the following ways:

“No Exceptions Taken"	No exceptions are taken and subject to compliance\ with the Contract Documents.
"Make Corrections Noted"	Minor corrections are noted and a re-submittal is not required subject to compliance with the corrections and the Contract Documents.
"Correct and Resubmit "	The submitted material, method or system meets the intent of the specifications, yet has insufficient data to determine compliance with the Contract Documents. Re-submittal is required.
"Rejected"	The submitted material, method or system does not meet the intent of the specifications, or has insufficient data to determine compliance with the Contract Documents.

C. Submission Procedures:

1. If a submission is satisfactory to the Engineer, the Engineer will annotate the submission, "No Exceptions Taken" or "Make Corrections Noted" and transmit five (5) copies to the Contractor. If a resubmission is required, the Engineer will annotate the submission “Correct and Resubmit” or "Rejected" and transmit five (5) copies to the Contractor for appropriate action.
2. The Contractor shall revise and resubmit submissions as required by the Engineer until submissions are acceptable to the Engineer.
3. Approval of a working and/or shop drawings by the Engineer will constitute acceptance of the subject matter for which the drawing was submitted and not for any other structure, material, equipment or appurtenances indicated as shown.
4. The Engineer's review of the Contractor's submissions shall in no way relieve the Contractor of any of his responsibilities under the Contract. An approval of a submission shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Documents.
5. Where as-built drawings, record drawings and specifications are available and when provided to the Contractor for use in performing the work, the Contractor shall verify the content of such drawings and specifications, the suitability of their use in performing the work and their accuracy for the purposes in which the Contractor intends to use any record or historical documents which may be obtained. In no case shall the Contractor assume that such documents reflect a true and accurate record of the construction. Acceptance of any such materials, records, and/or drawings shall in no way result in additional cost to the Owner should an error and/or omission in these documents result in additional costs to the Contractor.
6. On the first pages of all submittals, the Contractor shall provide a table showing all individual specification section paragraphs and drawings that apply to the equipment/component and a statement for each paragraph and drawing that the requirements have been met. The table shall be similar in format to the following, but shall include all relevant specification paragraphs and drawings:

Section 22 07 00 (example)	
1.2 A	Comply
1.2 B	Comply
1.3 A	Comply
1.3 B	Comply
1.3 C	Comply
1.4 A	Comply
1.4 A.1	Comply
1.4 A.2	Comply
Drawing M0.01	Comply

D. Equivalents: Manufacturers, trade names, and model numbers indicated herein and on Drawings shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Manufacturers listed first in these specifications and on Drawings were used as a basis of design. It will be the responsibility of the Contractor to verify all connections, physical sizes, capacities, etc. of all other manufacturer's items, both named or proposed. If the equipment necessitates changes in rough-in, piping, wiring or other building systems from that indicated on the Drawings, the Contractor shall be responsible for all additional costs included and notify other trades. Where such changes are required, detail drawings indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval.

E. Shop drawings, diagrams, product data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials where specifically required by specification and all items identified with an [S] behind the product title. Submittals not required by the Contract Documents will not be reviewed.

F. Shop Drawing manual(s) shall be submitted in accordance with Division 01 and shall include a complete product index, a copy of all approved shop drawings, and the name, address and telephone number of supplier or nearest representative. The manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.

G. Operation and Maintenance manual(s) shall be submitted in accordance with Division 01, this Section and shall include a complete product index in each volume, installation and maintenance data, parts lists, a copy of all approved shop drawings and the name, address and telephone number of supplier or nearest representative. All Plumbing devices, equipment and systems marked [O/M] in these specifications shall be included and all other such plumbing items that will require servicing before the duration of its useful life has been reached. Manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.

1.12 WARRANTY

A. The Contractor shall provide a warranty for a period of one year for all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.

B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.

C. Comply with requirements for additional warranties specified in Division 01.

D. Information on all warranties shall be included in the O&M Manuals specified herein to be provided to the Owner.

E. In phased construction, warranties shall not begin until substantial completion of the FINAL phase. Contractor shall maintain all new equipment and systems until that time. Owner will maintain all existing equipment and systems. Where new systems are connected to existing, the Contractor and Owner shall determine coordination of maintenance responsibilities at the preconstruction meeting.

***** USE THE FOLLOWING THROUGH (INTERRUPTION OF UTILITY SERVICES) WHERE DIVISION 22 WORK IS NOT COVERED IN DIVISION 31.**

1.13 EXCAVATION, BEDDING AND BACKFILLING

A. Excavation:

1. Perform all excavation of every description and of whatever substance encountered to the depths required for installation of the work as indicated on the Drawings or specified herein. The amount of trench opened at one time shall not exceed 200 feet including the backfilled portion of any trench which is not in condition for traffic. All excavated materials not required, or which are not suitable for backfill, shall be removed by the Contractor. Shoring shall be provided as necessary to protect existing facilities, new work, and the safety of personnel. Sheathing for pipe trenches shall be left in place at the Contractor's expense. Provide cofferdams or other structures required for construction at no additional cost.
2. Trenches shall be necessary width for the proper laying of the pipe with the banks as nearly vertical as practicable. Trench width at the top of the pipe shall not exceed 8 inches on either side of pipe. In rock excavation, the rocks shall be removed to a minimum of 6 inches from the sides of the pipe. Trenches shall be excavated to a depth of 4" below the normal pipe depth except where rock, shale or other hard material is encountered. Where rock, shale, or other hard material is encountered, the trench shall be excavated to a depth of 6" below normal pipe depth. Except where rock, shale, or other hard material is encountered, care shall be taken not to excavate below the depths indicated. Unauthorized over depths shall be backfilled with No. 10 crushed stone to levels previously specified. Whenever wet or otherwise unsuitable soil that is incapable of properly supporting the pipe is encountered in the bottom of the trench, such soil shall be removed to the depth required as determined by the Engineer and the trench backfilled to the proper grade with material as specified above for over depth.
3. Trenches for the utility piping shall be of a depth that will provide a minimum of _____ feet of cover from top of pipe to finished grade, unless otherwise indicated.
4. Excavation for Appurtenances: Excavation for manholes and similar appurtenances shall be sufficient to leave at least 12 inches in the clear between their outer surfaces and the embankment or shoring. Final earth supporting elevations shall be of bearing capacity for loads encountered. Rock and over depth shall be treated same as described for trench excavation.

B. Bedding and Backfilling:

1. Backfilling shall not commence until all tests have been performed and all utility systems conform to the Contract Documents.
2. Trenches shall be accurately graded and bedded with No. 10 crushed stone to the pipe level and thoroughly compacted as specified hereinafter. Bedding shall be installed and shaped in accordance with details shown on the Drawings. The pipe shall rest firmly on the bedding along the entire length of pipe except as necessary for proper jointing. Trenches shall be backfilled, thoroughly haunched and tamped. Settling the backfill with

water will not be permitted. The surface shall be graded to reasonable uniformity and mounded over trenches. Sewers shall be checked to determine any displacement of the pipe after trenches have been backfilled to two (2) feet above the pipe. A light shall be flashed between manhole or structure locations for straight sections of pipe and poor alignment or any other defects shall be remedied.

3. Compacted Backfill: All backfill material used in trenches under paved areas shall be classified as “compacted backfill”. Backfill materials shall be approved excavated material, or other select material, as approved by the Engineer, free from large clods of earth, cinders, ashes, refuse, vegetable or organic matter, and rocks or stones over 1” dimension. Backfill from the bottom of the trench to the center line of the pipe shall be compacted bedding. Backfill from this point to the top of the trench shall be placed in 6 inch layers and compacted to prevent future settlement. Methods and materials used in backfilling shall be provided to obtain 95 percent of maximum density at optimum moisture as determined by AASHO Standard T99, and as sufficient to prevent settlement of the pavement or surface.
4. Normal Backfill: For all backfill not under paved or future paved areas, backfill material shall be free from cinders, ashes, refuse, vegetable or organic matter, boulders, rocks or stones over 3” dimension. Backfill from the bottom of trench to centerline of pipe shall be compacted bedding. Above this point, backfill shall be placed and compacted in 6 inch layers to one foot above the top of the pipe. The remainder of the backfill shall be placed in one foot layers and tamped.
5. The Contractor shall supply the backfill material as specified herein without additional cost to the Owner.

1.14 CUTTING AND PATCHING OF EXISTING PAVEMENT AND CONCRETE

A. Pavement and concrete removed for trenching shall be saw cut before removal. All paving removed for trenches shall be restored to original condition with materials that match adjacent surfaces, as close as possible. The Contractor shall be responsible for any sinking of the backfill or pavement which may occur within one year from acceptance by the Owner.

1.15 EXISTING UNDERGROUND UTILITIES

A. The location of underground utilities shown on the Drawings shall be considered approximate, and any locations may not be indicated or known. Care shall be exercised by the Contractor during construction to locate and protect the known and unknown utilities, and to prevent disrupting the affected utility. The Contractor shall be responsible for repairing damage to any utility caused by his work.

B. Where any existing utilities are damaged, they shall be repaired as directed by the Engineer, with materials approved by the local utility company or the Owner, at no additional cost to the Owner.

1.16 VERIFYING MEASUREMENTS AND CONDITIONS

A. The exactness of grades, elevations, dimensions, or locations given on the Drawings, is not guaranteed by the Engineer. The Contractor shall, therefore, satisfy himself as to the accuracy of all grades, elevations, dimensions and locations. In all cases of interconnection of his work with existing or other work, he shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor’s failure to so verify all such grades, elevations, locations, or dimensions shall be promptly rectified by him without cost to Owner.

B. [**The Contractor shall base his bid on site examinations performed by him. This requirement is mandatory. The Contractor shall visit the site of the proposed project where work is scheduled to be performed, visit the existing buildings scheduled to be renovated, inspect piping systems where new-to-existing connections shall be made, etc., and ascertain for himself the amount of work required to fulfill the intent of his Contract and the complexity of the installation. The Contractor shall not hold the Engineer, his Consultants, agents or employees responsible for or bound by, any schedule, estimate or for any plan thereof. The Contractor shall study all Contract**

Documents to determine exactly the extent of work to be provided under each Section, and in installing new equipment and systems and coordinating the work with the other Trades and existing conditions.]

1.17 INTERRUPTION OF UTILITY SERVICES

A. It is necessary that close liaison be maintained with the Administrative Authorities in all matters affecting interruptions of any utility services serving the facility and existing buildings. Prior to interrupting any utility service, the Administrative Authorities shall be consulted and interruptions for connections made at a time (or times) suitable to the Administrative Authorities. Work shall be laid out and planned to limit the interruption times to a minimum.

1.18 COORDINATION OF WORK

A. General: The Contract Documents indicate the extent and general arrangement of the Plumbing systems. The Contractor shall be responsible for the coordination and proper relation of the Plumbing work to the building structure and to the work of other trades. No additional compensation or extension of completion time will be granted for extra work caused by the lack of coordination.

B. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, the building construction.

C. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the Plumbing Drawings are intended only as a guide to indicate relative locations of the Plumbing work. Refer to Architectural and Structural Drawings for building construction details. The Contractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination shall be completed to verify dimensions and characteristics for the installation of each system.

D. Unless necessitated by equipment access or otherwise indicated in the Contract Documents, all equipment, piping and conduit concealed above ceilings and in finished or utility spaces shall be routed as high as possible.

E. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall provide manual air vents and drains as required for his work to affect these offsets, transitions and changes in direction, as applicable.

F. Cutting and Patching: Comply with requirements for cutting and patching specified in Division 01.

[Cutting and Patching: Unless stated otherwise, the Plumbing Trade shall do all cutting necessary for the installation of his work. All work should be installed sufficiently in advance of new construction in order to permit installation of supports, sleeves, and similar items without cutting. Patching and repair work shall exactly match new and existing adjacent work in all respects and shall not be obvious as patching. Cutting which will in any way affect the building structure shall not be performed without permission of the Architect-Engineer. The Plumbing Trade is responsible for patching where he does cutting. Patching shall be done to the satisfaction of the Architect-Engineer.]

G. Roughing-In: Verify the locations of machines, door swings, block coursing, alignment of tile end and other similar features before roughing-in for Plumbing equipment components and/or controls.

H. Damage to Other Work: Each Contractor is responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Contractor who installed

the work, and as directed by the Architect-Engineer; the cost of which shall be paid for by the Contractor responsible for the damage.

1.19 EQUIPMENT INSTALLATION

A. General: Equipment shall be installed in accordance with manufacturer's instructions to conform with the details and application indicated. Where manufacturer's recommendations or installation instructions require options or accessories not specified, they shall be included and installed by the Contractor.

B. Supports: Provide necessary supports for all equipment and appurtenances as required; this includes but is not limited to frames or supports for items such as storage tanks, water heaters, air compressors, plumbing fixtures, pumps, valves, and other similar items requiring supports. Floor mounted equipment in Equipment Rooms shall be set on 4-inch high concrete foundation pads unless shown otherwise. All pads shall be poured such that the top of the pad is level. Foundation drawings, bolt setting information and foundation bolts shall be furnished by the subcontractors furnishing the equipment for all equipment required to have concrete foundations. Concrete for foundations shall be provided by Plumbing Subcontractor unless indicated otherwise. Except where indicated all equipment shall be anchored to concrete pads.

C. Service Area: All equipment and appurtenances shall be located to permit adequate service clearance in accordance with manufacturer's recommendations and as otherwise required. Service clearance shall include but not be limited to service and removal of plumbing system, water heaters, pumps, motors, controls and other of equipment. All piping and other equipment shall be located outside of the service area or shall be flanged for easy removal to facilitate equipment service. All equipment shall be located with sufficient distance from building features, structural components, and the equipment of other trades. Service clearance in front of electrical panels shall be minimum as required by National Electric Code (NEC) where applicable.

D. Temporary Requirements: Openings in equipment shall be kept plugged at all times until connection is made to the system. The ends of all pipes and equipment openings shall be kept plugged or capped properly with approved devices. Approved devices are items such as specially molded plastic caps, pipe plugs, test plugs and sheet metal caps.

1.20 EXISTING EQUIPMENT

A. General: Care shall be exercised to protect all existing equipment to be reused. The Contractor shall remove from operation all equipment that is shown to be reused and provide adequate protection including but not limited to prevention of corrosion, protection of seals, prevention of leaking, and prevention of internal/external contamination. All electronic components shall be protected from weather and moisture, deterioration and loss of programming.

1.21 SLEEVES AND INSERTS

A. General: Sleeves and inserts shall be provided and correctly located in the structure, as require for the work.

B. Inserts shall be steel and proper size for loads encountered.

C. Sleeves shall be provided for all pipes passing through concrete or masonry walls, partitions, concrete beams or slabs installed during construction of the wall, partition, beam or slab. Sleeves through existing concrete walls and slabs may be omitted if wall or slab can be core drilled and properly sealed in a manner acceptable to the Engineer. Sleeves placed horizontally in walls or in any position in beams shall be standard weight ASTM A53 steel pipe of length equal to thickness of wall or beam. Those placed vertically in non-waterproof floors shall be 20 gauge galvanized sheet steel of length equal to thickness of slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. Sleeves occurring in floors of rooms where hose bibs or floor drains occur, and in pipe spaces,

shall be standard weight steel pipe projecting 2" above the finished floor except in Equipment Rooms they shall project four (4) inches above floor. Sleeves in floors with waterproof membrane shall be provided with flanges or flashing rings and shall be clamped or flashed into membrane. All sleeves (and core drilled openings) shall be of sufficient diameter to clear bare or covered pipes by 1/4" all around except sleeves on lines subject to movement by expansion which shall clear the bare pipe or insulation on insulated pipe at least one inch all around. Pipes through exterior walls below grade and above footings shall be installed in sleeves having a minimum size of two larger pipe diameters and sealed watertight with flexible synthetic rubber seals. Sleeve shall have anchor and water stop plate. The entire assembly shall be tightened and adjusted and made watertight. Sleeves for pipes and conduit, penetrating fire (and smoke) rated partitions, walls and floors shall be sealed in accordance with the terms of U.L. Listed Through-Penetration Firestop Systems XHEZ as published in the U.L. Fire Resistance Directory. Penetrations shall exactly conform to details of the Firestop System indicated for the type of partition, wall and floor construction encountered. All penetrations through nonfireresistance rated floor assemblies and through the ceiling membrane of nonfireresistance rated roof assemblies shall be fireblocked with tightly packed mineral-wool insulation secured in place. All penetrations through equipment room walls and other areas of noise or heat generation shall be tightly sealed with mineral fiber rope. All penetrations through draftstop partitions shall be sealed to maintain the integrity of the partition. All firestopping and draftstopping of sleeves for Plumbing work shall be provided under Division 22.

D. Where piping and equipment are supported from the light gauge structure, all connections shall be made in strict accordance with this Section and with details indicated on the Drawings.

E. Piping 4" or larger shall not be supported by light gauge metal roof framing, but rather shall be supported only by the designated steel channels shown on the structural drawings. Any connections to the light gauge metal roof framing shall be limited to 150 pounds per connection and to a maximum of two such connections to any individual light gauge member.

F. All connections to the light gauge roof framing shall be made thru shear hangers at the face of the light gauge members. No clamps or eccentric connections shall be used that will induce twisting of the light gauge members. All connections shall be made by screws. No welding to the light gauge members will be allowed.

G. Hangers for multiple pipes shall be staggered to distribute weight on light gauge framing as evenly as possible.

1.22 PENETRATIONS THROUGH PRE-CAST HOLLOW-CORE SLAB SYSTEM

A. General: Contractor shall coordinate work with the pre-cast system. Refer to architectural and structural documents for details. Installation of work shall be in strict accordance with the pre-cast system manufacturer's recommendations, as approved by the Architect.

B. Openings: Holes in the slabs made in the field shall be made by the trade involved. Openings shall be made only through hollow cells, shall not exceed the width of the hollow cells, and shall not penetrate the webs between the cells or the pre-stressed strands unless prior approval is obtained from the Architect and the slab manufacturer. Holes shall not exceed 6" diameter without approval. Certain holes for pipe may be pre-cut. Refer to Structural Drawings for locations.

C. Cutting holes: Holes may be drilled or cut and trimmed with a chisel. Generally, holes will be made by cutting the outline of the hole through the lower portion of the slab from the underside and then cutting out the top side. All holes shall be made prior to the installation of the topping slab.

D. Sleeves: Sleeves are not required through pre-cast system slabs except where required to support packing material at hollow cores. Sleeves are required to be placed through concrete topping slab on top of the pre-cast slabs.

E. Supports: Hangers shall be supported from inserts or approved sockets, or toggle bolts in core slab construction. Hanger spacing shall be such that weight on hanger does not exceed 250 pounds for any one hanger. All hanger rods shall be minimum 3/8 inch in diameter. Where hanger rods must extend through slab, they shall be secured by two bolts over steel washers or plates on top of the slab in the floor fill or roof insulation space. Washers or plates shall not be less than 2" size and 1/4" thick. Larger plates are required for larger pipe supports. Cumulative thickness of plates, washers and bolts shall be 1/4" less than thickness of topping slab.

F. Explosives: Inserts set with explosives shall not be used.

1.23 ESCUTCHEONS

A. Where pipes pass through floors, walls or ceilings in finished rooms, they shall be fitted with chromium plated escutcheons of suitable pattern to effectively cover the rough opening. Where sleeves project above floors, special deep type escutcheons shall be provided.

1.24 ACCESS DOORS

A. Provide for all concealed valves, controls, dampers, junction boxes, equipment, or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for Plumbing work shall be furnished as a part of this Division to the General Contractor for installation. The Plumbing Sub-Contractor shall provide locations of all access doors such that service may be safely performed from a ladder, lift, or platform without the need for support from the ceiling system. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction. Doors occurring in rated construction shall be fire rated U.L. labeled access doors correlated to preserve the integrity of the rated construction. Doors leading to concealed spaces shall be provided with means to open from the inside. Doors shall be prime finish steel except those in toilets, shower rooms, locker rooms, kitchens and other similar areas shall be stainless steel with brushed finish.

1.25 ELECTRICAL WIRING AND EQUIPMENT

A. Motors shall be provided in place as an integral part of the driven equipment, ready for electrical connections. Motors shall be in accordance with NEMA Standards and of design suitable for the starting and running characteristics of the driven equipment. Minimum efficiencies of motors shall be "nominal" efficiency as indicated in ASHRAE Standard 90.1-1989 as amended by 90.1c-1993 (ie: 1 HP, 82.5%; 5 HP, 87.5%; 10 HP, 89.5%; 20 HP, 91%; 50 HP, 93%) and shall meet or exceed those contained in NEMA MG1-1993, Table 10-12.

B. Motor starters and motor protective switches shall be provided under Division 26 except where specified to be furnished specifically with the driven equipment. Accessories such as auxiliary contacts, hand-off-automatic switches, start-stop switches, pilot lights, control power transformers and other similar items shall be provided in or on the controllers as required by the control sequence indicated. Starting equipment, unless factory mounted on the equipment, shall be installed under Division 26.

D. Wiring, low voltage (100 volts or less) control wiring shall be provided as a part of Section 23 09 00 Instrumentation and Control for HVAC. Wiring material and installation shall be in strict accordance with Division 26 and manufacturer's recommendations to comply with the sequence of control indicated. Verify that wiring of all motors and controls required by equipment furnished is accomplished for the correct sequence of operation.

E. Wiring, line voltage (101 volts or higher) power or control wiring shall be furnished and installed under Division 26.

F. Disconnects shall be provided for each item of equipment under Division 26 unless specified otherwise in other sections.

G. Miscellaneous manual or automatic control and protective or signal devices required for the sequence of operation indicated for mechanical equipment shall be provided under the section of the specifications where the item of equipment is specified unless indicated otherwise.

1.26 PROTECTION FROM MOVING PARTS

A. Belts, pulleys, chains, gears, shafts, couplings and other rotating or moving parts located so that any person may come in close proximity thereto shall be fully enclosed or properly guarded.

1.27 RECORD OF UNDERGROUND LINES

A. On completion of the project, the Contractor shall prepare and submit to the Engineer a drawing on tracing paper and one blue line print to show the location of any underground lines installed in locations different from those on the Architect-Engineer's Drawings. The location of cleanouts, and the distance from the building to outside sewers, mains, and manholes shall be dimensioned.

1.28 CHARTS AND DIAGRAMS

A. General: Material as listed below shall be provided by the Contractor and shall be mounted in separate hardwood frames where directed in the field or folded and stored in a plastic document folder and located in the control cabinets. All charts, diagrams and schemes shall be photographic positives prepared from original tracings. A copy of charts and diagrams shall be included with O/M manuals.

B. Automatic Temperature Control Diagrams identified as to name, sequence of operation, location and number of systems. Components of a control system shall be identified as to location, function, temperature setting and manufacturer's part number.

C. Electric Sequence Control Diagrams of entire Mechanical system.

D. Charts for identification of valves.

1.29 INSTRUCTION OF OWNER'S REPRESENTATIVE

A. Contractors shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the Plumbing systems. Competent representatives of the Contractor shall spend such time as necessary to fully prepare the Owner to operate and maintain the Plumbing systems.

1.30 COMMISSIONING OF PLUMBING SYSTEMS:

A. The commissioning agent has been contracted directly with the Owner for this project. The Commissioning Agent has overall responsibility for planning and coordination of the commissioning process. However, commissioning involves all parties to the design and construction process, including the Plumbing Sub-Contractor

B. Refer to Section 01 91 13, General Commissioning Requirements, for systems to be commissioned and responsibilities for commissioning.

C. All prefunctional testing and startups for each component of a system shall be successfully completed by the Subcontractor responsible for the purchase of the equipment or system and shall be conducted prior to formal functional performance testing (FPT) of equipment or subsystems of the given system.

1.31 CONSTRUCTION STATUS REPORT

A. Each item of discrepancies noted on Construction Status Report prepared by the Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

1.32 GRAPHICS DATABASE

A. This project's Computer Aided Design & Drafting (CADD) drawing files may be purchased directly from the Engineer for use in preparing computer graphics specific to this project.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 PHASING OF WORK

A. Coordinate phasing requirements with Division 01.

3.02 DEMOLITION

A. Contractor shall visit site before bidding to determine extent of demolition.

B. Removal of Piping and Equipment: Remove all piping connections and equipment, plugging outlets, etc., such that are not required for present equipment and fixtures, or are not reused or needed for reconnecting new equipment and fixtures. Remove all equipment, fixtures, etc., indicated to be removed, or not reused or needed after the renovations are complete.

C. Where piping or other similar items passing through rated assemblies are removed; the assemblies shall be patched in accordance with UL so as to maintain the integrity of the assembly.

D. The Owner will select and retain such existing plumbing fixtures, equipment and materials which are indicated to be removed and not reused, as he desires. All other existing plumbing fixtures, equipment and materials indicated to be removed and not reused shall become the property of the Contractor, who shall promptly remove them from the premises. All existing equipment and fixtures indicated to be relocated shall be disconnected, removed, relocated and reconnected. All equipment and fixtures shall be protected from damage during demolition.

E. Miscellaneous: In all altered portions of the buildings, the Contractor shall remove or alter as necessary all existing Plumbing work that is not coordinated to operate with the new construction. Demolition shall not begin until the work schedule is approved by the owner. The work shall be scheduled to prevent any disruption to the normal operations of the building.

3.03 CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS:

A. The Plumbing Contractor shall make proper **waste vent water,** etc, connections to all fixtures and equipment furnished by Division22> such as, but not limited to, <**insert equipment**>where indicated on the drawings. This Contractor shall make connections to this equipment and fixtures and install water cutoffs or stops, and gas or air cocks at each piece of equipment. Comply with requirements for pipe and fittings specified under appropriate Division 22 Sections. herein.

B. The exact location of and roughing-in requirements of each piece of equipment shall be determined by the Contractor before roughing-in is done.

C. Check Valves: Provide check valves in hot and cold water connections to fixtures where faucets or valves generally remain open during extended operation.

END OF SECTION

APPENDIX A
LETTER OF INDEMNIFICATION

Project Name:

Project Location:

At the Contractors request, Stratus will provide electronic files of the Revit Models for their convenience and use, subject to the following terms and conditions:

Stratus electronic files are compatible with Autodesk Revit Product version for which they were designed. Autocad files will be provided in the Autocad 2018 DWG format. Stratus makes no representation as to the compatibility of these files with your hardware or your software.

Data contained on these electronic files is part of Stratus's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of project layout for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to Stratus. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Stratus, its officers, directors, employees, agents, or subconsultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless Stratus from all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to Addenda, Change Orders, or other revisions. Stratus makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed documents prepared by Stratus and the electronic files, the signed Contract Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm, and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

The use of the Revit Model files prepared by the Engineer shall not in any way negate the Contractor's responsibility for coordination with other trades or for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

All information added to the drawings by the Contractor shall be in a distinctively heavier pen weight and different font, such that all Contractor information can be clearly distinguished from the original files.

Any information added by the Contractor, which represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, Stratus reserves the right to remove all indicia of its ownership and/or involvement for each electronic display.

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The Engineer believes that no licensing or copyright fees are due to others on account of the transfer of the Revit Model files, but to the extent any are, the Contractor will pay the appropriate fees and hold the Engineer harmless from such claims as may arise.

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SECTION 22 0513

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes: General requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.03 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
   1. Motor controllers.
   2. Torque, speed, and horsepower requirements of the load.
   3. Ratings and characteristics of supply circuit and required control sequence.
   4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.01 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in plumbing equipment schedules or Sections.

B. Comply with NEMA MG 1 unless otherwise indicated.

C. Comply with IEEE 841 for severe-duty motors.

2.02 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.
   1. For motors with 2:1 speed ratio, consequent pole, single winding.
   2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: **Class F**

2.04 **SINGLE-PHASE MOTORS**

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
   1. Permanent-split capacitor.
   2. Split phase.
   3. Capacitor start, inductor run.
   4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 22 0523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Brass ball valves.
   2. Bronze ball valves.
   3. Iron ball valves.
   4. Bronze lift check valves.
   5. Bronze swing check valves.
   6. Iron swing check valves.

1.03 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.04 SUBMITTALS

A. Product Data: For each type of valve indicated [S]. Comply with requirements for submittals in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

1.05 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:
   1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   2. ASME B31.1 for power piping valves.
   3. ASME B31.9 for building services piping valves.

C. NSF Compliance for valve materials that will be in contact with potable water:
   1. NSF 61 "Drinking Water System Components - Health Effects".
   2. NSF 372 "Drinking Water System Components - Lead Content".

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves, and weld ends.
   3. Set gate, and globe valves closed to prevent rattling.
   4. Set ball and plug valves open to minimize exposure of functional surfaces.

5. Block check valves in either closed or open position.

B. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:
   1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
   2. Handwheel: For valves other than quarter-turn types.
   3. Handlever: For quarter-turn valves NPS 6 and smaller [**except plug valves**].
   4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every **5** plug valves, for each size square plug-valve head.
   5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
   1. Gate Valves: With rising stem.
   2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

F. Valve-End Connections:
   1. Flanged: With flanges according to ASME B16.1 for iron valves.
   2. Solder Joint: With sockets according to ASME B16.18.
   3. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.02 BRASS BALL VALVES[S]

A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Crane Co.; Crane Valve Group; Crane Valves.
      b. Crane Co.; Crane Valve Group; Jenkins Valves.
      c. DynaQuip Controls.
      d. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
      e. Hammond Valve.
      f. Jamesbury; a subsidiary of Metso Automation.
      g. Jomar International, LTD.
      h. Kitz Corporation.
      i. Legend Valve.
      j. Marwin Valve; a division of Richards Industries.
      k. Milwaukee Valve Company.
      l. NIBCO INC.
      m. Red-White Valve Corporation.

n. RuB Inc.

2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Brass.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

B. Two-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
   d. Hammond Valve.
   e. Jamesbury; a subsidiary of Metso Automation.
   f. Kitz Corporation.
   g. Marwin Valve; a division of Richards Industries.
   h. Milwaukee Valve Company.
   i. RuB Inc.
2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Stainless steel.
   i. Ball: Stainless steel, vented.
   j. Port: Full.

C. Two-Piece, Regular-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hammond Valve.
   b. Jamesbury; a subsidiary of Metso Automation.
   c. Legend Valve.
   d. Marwin Valve; a division of Richards Industries.
   e. Milwaukee Valve Company.
2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Brass.
   i. Ball: Chrome-plated brass.
   j. Port: Regular.

D. Three-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Jomar International, LTD.
    b. Kitz Corporation.
    c. Marwin Valve; a division of Richards Industries.
    d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
    a. Standard: MSS SP-110.
    b. SWP Rating: 150 psig.
    c. CWP Rating: 600 psig.
    d. Body Design: Three piece.
    e. Body Material: Forged brass.
    f. Ends: Threaded.
    g. Seats: PTFE or TFE.
    h. Stem: Stainless steel.
    i. Ball: Stainless steel, vented.
    j. Port: Full.

2.03 BRONZE BALL VALVES [S]

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. American Valve, Inc.
    b. Conbraco Industries, Inc.; Apollo Valves.
    c. Crane Co.; Crane Valve Group; Crane Valves.
    d. Hammond Valve.
    e. Lance Valves; a division of Advanced Thermal Systems, Inc.
    f. Legend Valve.
    g. Milwaukee Valve Company.
    h. NIBCO INC.
    i. Red-White Valve Corporation.
    j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
    a. Standard: MSS SP-110.
    b. SWP Rating: 150 psig.
    c. CWP Rating: 600 psig.
    d. Body Design: Two piece.
    e. Body Material: Bronze.
    f. Ends: Threaded.
    g. Seats: PTFE or TFE.
    h. Stem: Bronze.
    i. Ball: Chrome-plated brass.
    j. Port: Full.

B. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Conbraco Industries, Inc.; Apollo Valves.
    b. Crane Co.; Crane Valve Group; Crane Valves.
    c. Hammond Valve.
    d. Lance Valves; a division of Advanced Thermal Systems, Inc.
    e. Milwaukee Valve Company.
    f. NIBCO INC.
    g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
    a. Standard: MSS SP-110.

b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.
k. Port: Regular.

C. Three-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Conbraco Industries, Inc.; Apollo Valves.
b. DynaQuip Controls.
c. Hammond Valve.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Red-White Valve Corporation.
2. Description:
a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Three piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

D. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Conbraco Industries, Inc.; Apollo Valves.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.
2. Description:
a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Three piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

2.04 IRON BALL VALVES [S]

A. Class 125, Iron Ball Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.

c. Kitz Corporation.
d. Sure Flow Equipment Inc.
e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
a. Standard: MSS SP-72.
b. CWP Rating: 200 psig.
c. Body Design: Split body.
d. Body Material: ASTM A 126, gray iron.
e. Ends: Flanged.
f. Seats: PTFE or TFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel.
i. Port: Full.

2.05 BRONZE LIFT CHECK VALVES [S]

A. Class 125, Lift Check Valves with Bronze Disc:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
2. Description:
a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Design: Vertical flow.
d. Body Material: ASTM B 61 or ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

2.06 BRONZE SWING CHECK VALVES [S]

A. Class 125, Bronze Swing Check Valves with Bronze Disc:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
l. Zy-Tech Global Industries, Inc.
2. Description:
a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

B. Class 150, Bronze Swing Check Valves with Bronze Disc:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Kitz Corporation.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Red-White Valve Corporation.
i. Zy-Tech Global Industries, Inc.

2. Description:
a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 300 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

2.07 IRON SWING CHECK VALVES [S]

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Kitz Corporation.
f. Legend Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Sure Flow Equipment Inc.
l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
m. Zy-Tech Global Industries, Inc.

2. Description:
a. Standard: MSS SP-71, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Gasket: Asbestos free.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for gate and globe valves 6” and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Lift Check Valves: With stem upright and plumb.

3.03 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, gate, or plug valves.
2. Throttling Service: **ball** valves.
3. Pump-Discharge Check Valves:
   a. NPS 2 and Smaller: Bronze swing check valves with bronze disc.
   b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with metal seat.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.05 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG OR LESS)

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: Threaded ends.
2. Ball Valves: Two piece, full port, brass or bronze with bronze stainless-steel trim.
3. Bronze Lift Check Valves: Class 125, bronze disc.
4. Bronze Swing Check Valves: Class 150, bronze disc.
5. Bronze Gate Valves: Class 150, NRS.

B. Pipe NPS 2-1/2 and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
2. Iron Swing Check Valves: Class 125 metal seats.
3. Iron Gate Valves: [Class 125].

3.06 HIGH-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 TO 200 PSIG

A. Pipe NPS 2 and Smaller:
   1. Bronze Valves: Threaded ends.
   2. Ball Valves: Two piece, full port, bronze with brass or bronze trim.
   3. Bronze Swing Check Valves: Class 150, [bronze] disc.
   4. Bronze Gate Valves: Class 150, NRS.

B. Pipe NPS 2-1/2 and Larger:
   1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
   2. Iron Swing Check Valves: Class 250, metal seats.
   3. Iron Gate Valves: Class 250, NRS.

3.07 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 3 and Smaller:
   1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends. Valves in Copper Pressure-Seal Joint piping systems may have pressure seal ends.
   2. Ball Valves: Two or Three piece, full port, brass or bronze with bronze or stainless-steel trim.
   3. Bronze Swing Check Valves: **Class 125**, bronze disc.
   4. Bronze Gate Valves: **Class 125** NRS.
   5. Bronze Globe Valves: **Class 125** bronze disc.

B. Pipe NPS 4 and Larger:
   1. Iron Valves, NPS 2-1/2 to NPS 4: flanged ends.
   2. Iron Ball Valves: Class 150.
   3. Iron Swing Check Valves: [Class 125], metal seats.
   4. Iron Gate Valves: Class 125, NRS.
   5. Iron Globe Valves: Class 125.

3.08 [SANITARY-WASTE] [AND] [STORM-DRAINAGE] VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:
   1. Bronze [**and Brass]** Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two piece, full port, bronze with bronze trim.
   3. Bronze Swing Check Valves: Class 125, bronze disc.
   4. Bronze Gate Valves: Class 125, NRS.

B. Pipe NPS 2-1/2 and Larger:
   1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
   2. Iron Ball Valves: Class 150.
   3. Iron Swing Check Valves: Class 125, metal seats.
   4. Iron Gate Valves: Class 125, NRS.
   5. Iron Globe Valves: Class 125.

END OF SECTION

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Metal pipe hangers and supports.
   2. Trapeze pipe hangers.
   3. Metal framing systems.
   4. Thermal-hanger shield inserts.
   5. Fastener systems.
   6. Pipe stands.
   7. Pipe positioning systems.
   8. Equipment supports.

1.03 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.04 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to [**SEI/ASCE 7 "Minimum Design Loads for Buildings and Other Structures**]
   1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
   2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
   3. Design seismic-restraint hangers and supports for piping and equipment [**and obtain approval from authorities having jurisdiction**].

1.05 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Comply with requirements in Division 01 and Section 22 04 00 "General Requirements for Plumbing".

B. Shop Drawings: [**Signed and sealed by a qualified professional engineer.**] Show fabrication and installation details and include calculations for the following; include Product Data for components:
   1. Trapeze pipe hangers.
   2. Metal framing systems.
   3. Pipe stands.
   4. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Detail fabrication and assembly of trapeze hangers.

2. Design Calculations: Calculate requirements for designing trapeze hangers.

D. Welding certificates.

1.06 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.01 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
   3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
   4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
   5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
   3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:
   1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
   2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel, stainless steel or cadmium plated steel.

2.02 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.03 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Allied Tube & Conduit.
      b. Cooper B-Line, Inc.
      c. Flex-Strut Inc.
      d. GS Metals Corp.
      e. Thomas & Betts Corporation.
      f. Unistrut Corporation; Tyco International, Ltd.
      g. Wesanco, Inc.
   2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
   3. Standard: MFMA-4.
   4. Channels: Continuous slotted steel channel with inturned lips.

5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Paint Coating: Alkyd.

B. Non-MFMA Manufacturer Metal Framing Systems:
1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Anvil International; a subsidiary of Mueller Water Products Inc.
b. Empire Industries, Inc.
c. ERICO International Corporation.
d. Haydon Corporation; H-Strut Division.
e. NIBCO INC.
f. PHD Manufacturing, Inc.
g. PHS Industries, Inc.
2. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Coating: Paint.

2.04 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa)] minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.05 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, [**zinc-coated**] [**stainless-**] steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.06 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece [**plastic**] [**stainless-steel**] base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:
   1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
   2. Base: Plastic or Stainless steel.
   3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
   4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:
   1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
   2. Bases: One or more; plastic.
   3. Vertical Members: Two or more protective-coated-steel channels.
   4. Horizontal Member: Protective-coated-steel channel.
   5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.07 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.08 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.09 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
   1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
   2. Field fabricate from ASTM A 36, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:
   1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
   2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:
   1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
   2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Comply with Division 07 Section "Roof Accessories" for curbs.

G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Comply with Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:
   1. Attach clamps and spacers to piping.
      a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
      b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Insulated Pipes NPS 2 1/2 inches and Larger: Include reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.02 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.03 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.04 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.05 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.06 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
   2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
   3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
   4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
   5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
   6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
   7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
   8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
   9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
   10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
   11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
   12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
   13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
   14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.

15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
    1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
    2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
    3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
    1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
    2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
    3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
    4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
    5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
    6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
    7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
    8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
        a. Horizontal (MSS Type 54): Mounted horizontally.
        b. Vertical (MSS Type 55): Mounted vertically.
        c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

S. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 22 0553

PAINTING AND IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Prepare and paint Division 22 equipment, accessories, piping and miscellaneous materials located in Equipment Rooms, Boiler Rooms and other utility areas housing Plumbing equipment and materials.
   2. Identification of piping in exposed and accessible locations.
   3. Marking and designation of equipment.

B. Not Included in Section:
   1. Painting of piping or equipment exposed in finished areas other than those listed under “Section Includes” above.
   2. **Painting of existing equipment or piping**

1.03 SUBMITTALS:

A. For each type of Product indicated [S]. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing.

1.04 REFERENCED STANDARDS:

A. General: The following standards or codes (latest edition) form a part of this specification to the extent indicated by the reference thereto.

B. American National Standards Institute (ANSI):

ANSI A13.1	Scheme for Identification of Piping Systems

C. American Society for Testing and Materials (ASTM):

ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM C 411	Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

D. National Fire Protection Association (NFPA):

Standard 255	Method of Test of Surface Burning Characteristics of Building Materials

E. Underwriters Laboratories, Inc. (UL)

Standard 723	Tests for Surface Burning Characteristics of Building Materials

F. California Department of Health Services

Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Except as otherwise specified, materials shall be the products of the following manufacturers:

Sherwin-Williams

Pratt and Lambert

Pittsburgh Paints (PPG)

Benjamin Moore

Porter Paints

Seton Identification Products

2.02 MATERIALS:

A. Deliver all paints and materials to the project site in their unopened original containers with all labels intact and legible at the time of use.

B. For adhesives and sealants applied within the building waterproofing envelope, comply with low emitting requirements in Division 01section"Indoor Air Quality Requirements."

C. All coatings exposed to supply and return airstreams and where applied to exposed surfaces in a return air plenum, shall have a composite flame spread rating not exceeding 25, and a smoke developed rating not exceeding 50 as tested under procedure ASTM E-84-75, NFPA 255 and UL 723. Coatings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411, latest edition.

D. Sherwin-Williams Industrial Maintenance Coatings System 4000 products are listed below to establish color and a standard of quality.

1. All Hangers and Supports: One coat Pro-Industrial Zero VOC Acrylic Gloss Black.
2. All major items of equipment and equipment supports including pumps, tanks and all other similar items shall be painted as follows:
   a. Uninsulated hot surfaces on equipment, operating at or above 150°F, shall be painted with two coats of No. B59S8 Heat Resistant Aluminum.
   b. Other unfinished equipment surfaces of aluminum, iron and steel shall be primed with one coat of Pro-Cryl Primer (1000g/L). Galvanized surfaces shall be chemically prepared and primed with one coat of Galvite B50W3 Primer. Field insulated surfaces shall be primed with No. B28W200 Wall Primer. Where equipment is furnished with factory finish coat, only touch up to match finish is required at any damaged areas. Finish all equipment with two coats of Pro–Industrial Zero VOC Acrylic Gloss, No. SW4063 Robotic Blue. Exterior of belt guards and other protective guards shall be finished with two coats of Pro–Industrial Zero VOC Acrylic Gloss, No. SW4084 safety yellow color. Interior of and all items covered by belt guards and other protective guards shall be finished with two coats of No. SW4083 safety orange color.
   c. Nameplates and Testing Agency Labels on equipment or machinery shall not be painted.
3. Piping: Exposed in equipment rooms and where connections are made to equipment located in storage rooms and other utility type areas.
   a. Priming:
      (1) Insulation Canvas or Paper Jacket: One coat Pro-Cryl Primer (1000g/L).
      (2) Insulation Aluminum Jacket: One coat Pro-Cryl Primer (1000g/L).
      (3) Bare Iron or Steel or Copper: One coat Pro-Cryl Primer (1000g/L).
      (4) Galvanized Steel: Pipes shall be chemically prepared and primed with one coat of Pro-Cryl B66-310 Primer.
      (5) Asphalt Coated Pipe: One coat No. B28W200 Wall Primer.

b. Finish: All pipe lines and the supports or hangers therefore, shall be finished with Pro–Industrial Zero VOC Acrylic Gloss gray No. SW4028 Gypsum applied in sufficient number of coats to effectively cover the prime coat. Painting of pipe hangers is specified hereinbefore.
c. Exterior gas piping shall be primed and painted with two (2) coats of Series 54 Alkyd Gloss Enamel, No. SW4084 Safety Yellow Color.
d. Materials shall be as recommended by the manufacturer for the surface to be finished.
e. Unless otherwise specified, primer shall be by the same manufacturer as the finish coat.
f. Materials shall not be thinned or cut except as recommended by the coating manufacturer. Thinners shall be by the same manufacturer as the primer and finish coat.

E. Valve tags shall be neat circular brass with designations stamped thereon, attached with solid brass jack chain to each valve stem or handle.

F. Each item of equipment such as pumps, water heaters, tempering valves and equipment control devices such as motor starters, disconnect switches, etc. shall be properly marked with laminated engraved plastic nameplates fastened with sheet metal screws, bolts, rivets or permanent adhesive. Pressure sensitive tape is not acceptable.

G. All piping, insulated and un-insulated, shall be identified with Seton Ultra-Mark or equal wrap around piping system markers and arrow flow directional marker. Markers shall be pre-coiled, semi-rigid plastic or polyester with sealed color graphics. Markers shall be minimum 12 inches long with 1-¼ inch high letters, formed to cover entire circumference of the pipe. Markers shall be attached to piping using plastic tie wraps. Pipe identification shall use the same designations or abbreviations used on the drawings. Marker colors shall be in accordance with ANSI.

H. For field applications within the weatherproofing system, all paints, adhesives and sealants shall comply with the requirements of the California Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

A. The work shall be accomplished by qualified mechanics skilled in the painting trade. Painting of equipment, piping, ductwork and other materials shall not commence until all testing is complete and systems are ready for operation. Materials shall be applied according to manufacturer's directions. All containers shall be securely closed when not in use. Flammable materials shall not be stored on premises. Flammable waste shall be disposed of daily in devices approved for such purposes. Materials shall be evenly spread, and smoothly flowed on without runs or sags. Each coat shall be thoroughly dry before application of succeeding coats.

3.02 PROTECTION OF WORK:

A. The painters shall protect all adjacent surfaces with drop covers during the process of painting. Upon completion, paint spots, if any, shall be removed from all surfaces.

3.03 PREPARATION OF SURFACE:

A. Surfaces to be painted shall be completely dry before applying paint. Metal surfaces shall be cleaned with mineral spirits before applying materials. Rust and scale shall be removed by wire brushing or sanding. Galvanized surfaces shall be chemically pretreated with crystalline (zinc phosphate) phosphate in strict accordance with the manufacturer's recommendations. Surfaces shall not be painted when the temperature is, or is likely to be, near the freezing point, or when they are exposed to hot sun.

3.04 **IDENTIFICATION OF PIPES AND EQUIPMENT**:

A. Equipment: After all other painting is completed; each major item of equipment shall be properly identified with nameplates. Identification symbols and designations shall be the same as shown on the Contract Documents. Where equipment is installed above lay-in ceilings the plastic nameplate shall be adhered to the face of the T-bar support so that it can be identified from within the space.

B. Apply piping system markers after completion of required insulation and finishes on piping systems. Markers shall be applied in the following locations and where identified by the Engineer:

1. At each valve and at connection to equipment.
2. At every tee and branch connection.
3. At each riser including branch risers from mains.
4. At each side of a pipe passage through floors, walls and partitions.
5. Every 15 feet on straight runs of piping mains and branches.
6. Within 6 feet of elbows (each side).
7. At access doors or similar points that permit view of concealed piping.
8. Markers shall be provided on all piping above lay-in ceilings.
9. Provide arrow markers showing direction of flow incorporated into, or adjacent to, each piping system marker.
10. Apply all piping system markers where view is unobstructed, and legends can be read and easily identified.
11. Apply all tags and piping system markers in accordance with the supplier's instructions.

END OF SECTION

SECTION 22 0700

PLUMBING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Insulation Materials:
      a. Calcium silicate.
      b. Flexible elastomeric.
      c. Mineral fiber.
      d. Phenolic.
      e. Polyolefin.
   2. Insulating cements.
   3. Adhesives.
   4. Sealants.
   5. Factory-applied jackets.
   6. Field-applied jackets.
   7. Tapes.
   8. Securements.
   9. Corner angles.

1.03 DEFINITIONS

A. Runout: Last section of pipe from branch or main to fixtures or equipment.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any). Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

B. LEED Submittal:
   1. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

C. Shop Drawings:
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail attachment and covering of heat tracing inside insulation.
   3. Detail insulation application at pipe expansion joints for each type of insulation.
   4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
   5. Detail removable insulation at piping specialties, equipment connections, and access panels.
   6. Detail application of field-applied jackets.
   7. Detail application at linkages of control devices.
   8. Detail field application for each equipment type.

D. Qualification Data: For qualified Installer.

E. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation

materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

F. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.07 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Section 22 05 29 “Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.08 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS [S]

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Calcium Silicate:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Industrial Insulation Group (The); Thermo-12 Gold.
2. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
3. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
4. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

G. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Aeroflex USA Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fibrex Insulations Inc.; Coreplus 1200.
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000(Pipe Insulation.
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation.
2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, [**without factory-applied jacket**] [**with factory-applied ASJ**] [**with factory-applied ASJ-SSL**]. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied [**ASJ**] [**FSK jacket**] complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. CertainTeed Corp.; CrimpWrap.
   b. Johns Manville; MicroFlex.
   c. Knauf Insulation; Pipe and Tank Insulation.
   d. Manson Insulation Inc.; AK Flex.
   e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.02 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.

2.03 SEALANTS

A. Joint Sealants: Provide sealants either manufactured or recommended by the insulation material manufacturer.

2.04 FACTORY-APPLIED JACKETS [S]

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
    a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

2.05 FIELD-APPLIED JACKETS [S]

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. Metal Jacket:

1. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105 or 5005, Temper H-14.
    a. Factory cut and rolled to size.
    b. Finish and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper
    d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
    e. Factory-Fabricated Fitting Covers:
        1) Same material, finish, and thickness as jacket.
        2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.
        5) End caps.
        6) Beveled collars.
        7) Valve covers.
        8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
2. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240.
    a. Factory cut and rolled to size.
    b. Material, finish, and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper
    d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
        1) Same material, finish, and thickness as jacket.
        2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.
        5) End caps.
        6) Beveled collars.
        7) Valve covers.

8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

C. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Pittsburgh Corning Corporation; Pittwrap.
   b. Polyguard; Insulrap No Torch 125.

2.06 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
   b. Compac Corp.; 104 and 105.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   b. Compac Corp.; 110 and 111.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
   d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   b. Compac Corp.; 120.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
   d. Venture Tape; 3520 CW.
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

D. PVDC Tape: White vapor-retarder PVDC tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Dow Chemical Company (The); Saran 540 Vapor Retarder Tape.
2. Width: 3 inches.
3. Film Thickness: **4 mils**.
4. Adhesive Thickness: 1.5 mils.
5. Elongation at Break: 145 percent.
6. Tensile Strength: 55 lbf/inch in width.

2.07 SECUREMENTS

A. Bands:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Childers Products; Bands.
      b. PABCO Metals Corporation; Bands.
      c. RPR Products, Inc.; Bands.
   2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type [**304**] [**316**] [**304 or Type 316**]; 0.015 inch thick, [**1/2 inch**] [**3/4 inch**] wide with [**wing seal**] [**closed seal**] [**wing or closed seal**].
   3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, [**1/2 inch**] [**3/4 inch**] wide with [**wing seal**] [**closed seal**] [**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. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

2.08 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105 or 5005; Temper H-14.

C. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type [**304**] [**316**] [**304 or 316**].

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
   1. Verify that systems and equipment to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
   1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.03 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [**2 inches**] [**4 inches**] o.c.
      a. For below ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.
   4. Manholes.
   5. Handholes.
   6. Cleanouts.

3.04 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
   4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
   4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
   1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:
   1. Pipe: Install insulation continuously through floor penetrations.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.05 EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION [USE ONLY IF TANKS ARE NOT PRE-INSULATED]

A. Mineral Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for **100** percent coverage of tank and vessel surfaces.
2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
3. Protect exposed corners with secured corner angles.
4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
    a. Do not weld anchor pins to ASME-labeled pressure vessels.
    b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
    c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints, and 16 inches o.c. in both directions.
    d. Do not overcompress insulation during installation.
    e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
    f. Impale insulation over anchor pins and attach speed washers.
    g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
5. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches from each end. Install wire or cable between two circumferential girdles 12 inches o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches o.c. Use this network for securing insulation with tie wire or bands.
7. Stagger joints between insulation layers at least 3 inches.
8. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

3.06 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.07 CALCIUM SILICATE INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.

3.08 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.09 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.10 PHENOLIC INSULATION INSTALLATION

A. General Installation Requirements:
1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with 0.062-inch wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.

B. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.11 FIELD-APPLIED JACKET INSTALLATION

A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.12 FINISHES

A. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 22 05 53 “Painting and Identification for Plumbing Piping and Equipment”.

B. Do not field paint aluminum or stainless-steel jackets.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to [**one**] <**Insert number**> location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
2. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to [**three**] <**Insert number**> locations of straight pipe, [**three**] <**Insert number**> locations of threaded fittings, [**three**] <**Insert number**> locations of welded fittings, [**two**] <**Insert number**> locations of threaded strainers, [**two**] <**Insert number**> locations of welded strainers, [**three**] <**Insert number**> locations of threaded valves, and [**three**] <**Insert number**> locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.14 EQUIPMENT INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.

B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.

C. Domestic water and domestic water hydropneumatic tank insulation shall be **[one of]** the following: [**Use only where storage tanks are not factory insulated]**.

1. Flexible Elastomeric: **1 inch** thick.
2. Mineral-Fiber Pipe and Tank: **1 inch** thick.

D. Domestic hot-water storage tank insulation shall be [**one of**] the following, of thickness to provide an R-value of **12.5**: **[Use only where storage tanks are not factory insulated]**.

1. Mineral-fiber pipe and tank.
2. Phenolic.

E. Piping system filter-housing insulation shall be the following:

1. Mineral-Fiber Pipe and Tank: [**2 inches**] <**Insert thickness**> thick.

3.15 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
   1. Drainage piping located in crawl spaces.
   2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.16 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:
   1. Insulation shall be the following:
      a. Calcium Silicate: NPS 2-1/2 pipe and larger, 1inch thick at pipe hangers. Calcium silicate shall be installed in preformed sections 12inches long enclosing pipe around entire circumference.
      b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
      c. Flexible Elastomeric: 1 inch thick in walls and pipe chases after Building “Dry-In”.
      d. Polyolefin: 1 inch thick under floor slab and in walls and chases prior to Building “Dry-In”.
   2. Runouts NPS 2 and smaller: Insulation shall be the following:
      a. Mineral–Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
      b. Flexible Elastomeric: 1/2 inch thick in walls and chases after Building “Dry-In”.
      c. Polyolefin: 1/2 inch thick in walls and chases prior to Building “Dry In”.

B. Domestic Hot and Recirculated Hot Water:
   1. NPS 2 and Smaller: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
      b. Flexible Elastomeric: 1 inch thick in walls and chases after Building Dry-In”.
      c. Polyolefin: 1 inch thick under floor slab, and in walls and chases prior to building “Dry In”.
   2. NPS 2-1/2 and Larger: Insulation shall be the following:
      a. Calcium Silicate: 1-1/2 inch thick at pipe hangers. Calcium silicate shall be installed in preformed sections 12 inches long enclosing pipe around entire circumference.
      b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1- 1/2 inches thick
      c. Flexible Elastomeric: 1-1/2 inches thick, in walls and chases after Building “Dry-In”.
      d. Polyolefin: 1- 1/2 inches thick in walls and chases prior to Building “Dry-In”.
   3. Runouts NPS 2”and smaller”
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
      b. Flexible Elastomeric: 1 inch thick in walls and chases after Building “Dry-In”.
      c. Polyolefin: 1 inch thick in walls and chases prior to Building “Dry-In”.

C. Stormwater and Overflow:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
      b. Interior rain conductors, and secondary rain conductors including fittings, from the bottom of the roof drains to 3’-6” below the last fitting where the lowest horizontal offset turns down into the vertical.
      c. Down 4’-0” below the roof drain on vertical rain conductors without horizontal offsets.

D. Roof Drain and Overflow Drain Bodies:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

E. Storm Drain or Sanitary Waste Piping Where Heat Tracing Is Installed:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.

F. Floor Drains, Traps, and Sanitary Drain Piping Receiving Condensate and Equipment Drain Water below 60 Deg F:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

G. Hot Service Drains: **[Sterlizer]**
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

H. Hot Service Vents: **[Sterlizer]**
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

3.17 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Domestic Water Piping:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
      b. Polyolefin: 2 inches thick.

B. Domestic Hot and Recirculated Hot Water:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
      b. Polyolefin: 2 inches thick.

C. Storm Drain or Sanitary Waste Piping Where Heat Tracing Is Installed:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.

3.18 OUTDOOR, UNDERGROUND PIPING INSULATION SCHEDULE

A. Loose-fill insulation, for belowground piping, is specified in Division 33 piping distribution Sections.

3.19 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:
   1. None.
   2. Aluminum, [**Smooth**] [**Corrugated**] [**Stucco Embossed**]: [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] [**0.032 inch**] [**0.040 inch**] thick.
   3. Painted Aluminum, [**Smooth**] [**Corrugated**] [**Stucco Embossed**]: [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] [**0.032 inch**] thick.
   4. Stainless Steel, Type [**304**] [**316**] [**304 or 316**], [**Smooth 2B Finish**] [**Corrugated**] [**Stucco Embossed**]: [**0.010 inch**] [**0.016 inch]** [**0.020 inch**] [**0.024 inch**] thick.
   5. <**Insert jacket type.**>

D. Piping, Exposed:
   1. None.
   2. Aluminum, [**Smooth**] [**Corrugated**] [**Stucco Embossed**]: [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] [**0.032 inch**] [**0.040 inch**] thick.
   3. Painted Aluminum, [**Smooth**] [**Corrugated**] [**Stucco Embossed**]: [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] [**0.032 inch**] thick.
   4. Stainless Steel, Type [**304**] [**316**] [**304 or 316**], [**Smooth 2B Finish**] [**Corrugated**] [**Stucco Embossed**]: [**0.010 inch**] [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] thick.
   5. <**Insert jacket type.**>

3.20 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.
2. Aluminum, [**Smooth**] [**Corrugated**] [**Stucco Embossed**]: [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] [**0.032 inch**] [**0.040 inch**] thick.
3. Painted Aluminum, [**Smooth**] [**Corrugated**] [**Stucco Embossed**]: [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] [**0.032 inch**] thick.
4. Stainless Steel, Type [**304**] [**316**] [**304 or 316**], [**Smooth 2B Finish**] [**Corrugated**] [**Stucco Embossed**]: [**0.010 inch**] [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] thick.
5. <**Insert jacket type.**>

D. Piping, Exposed:

1. [**Painted**]Aluminum, [**Smooth**] [**Corrugated**] [**Stucco Embossed**] [**with Z-Shaped Locking Seam**]: [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] [**0.032 inch**] [**0.040 inch**] thick.
2. Stainless Steel, Type [**304**] [**316**] [**304 or 316**], [**Smooth 2B Finish**] [**Corrugated**] [**Stucco Embossed**] [**with Z-Shaped Locking Seam**]: [**0.010 inch**] [**0.016 inch**] [**0.020 inch**] [**0.024 inch**] thick.
3. <**Insert jacket type.**>

3.21 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION

SECTION 22 1116

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Under-building slab and above ground domestic water pipes, tubes, fittings, and specialties inside the building.
   2. Specialty valves.
   3. Flexible connectors.
   4. Water meters furnished by utility company for installation by Contractor.
   5. Water meters.

1.03 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to SEI/ASCE 7” Minimum Design loads for Buildings and other Structures”.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Comply with requirements in Division 1 and Section 22 04 00 “General Requirements for Plumbing”.

B. LEED Submittal:
   1. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.

C. Water Samples: Specified in "Cleaning" Article.

D. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are coordinated with each other, using input from Installers of the items involved:
   1. Fire-suppression-water piping.
   2. Domestic water piping.
   3. Compressed air piping.
   4. HVAC hydronic piping.
   5. Electric Switchgear, Panelboards

E. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. NSF Compliance for materials that will be in contact with potable water :
   1. Comply with NSF 14 for plastic, potable domestic water piping and components.
   2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."
   3. Comply with NSF 372, "Drinking Water System Components- Lead Content."

1.06 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
   1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
   2. Do not proceed with interruption of water service without Owner's written permission.

1.07 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: Under-building slab ASTMB88, Type K; above ground ASTM B 88, Type L; water tube, drawn temper.
   1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
   2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
   3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
   4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
   5. Copper Pressure-Seal-Joint Fittings:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Elkhart Products Corporation; Industrial Division.
         2) NIBCO INC.
         3) Viega; Plumbing and Heating Systems.
      b. NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
      c. NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.
   6. Copper Push-on-Joint Fittings:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
         1) NVent LLC.
      b. Description: Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22; with stainless-steel teeth and EPDM-rubber O-ring seal in each end instead of solder-joint ends.
   7. Copper-Tube Extruded-Tee Connections:
      a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) T-DRILL Industries Inc.
         2) <**Insert manufacturer's name**>.
      b. Description: Tee formed in copper tube according to ASTM F 2014.

B. Soft Copper Tube: Under building slab, ASTM B 88, Type K water tube, annealed temper.

1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
2. Copper Pressure-Seal-Joint Fittings:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Elkhart Products Corporation; Industrial Division.
        2) NIBCO INC.
        3) Viega; Plumbing and Heating Systems.
    b. NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
    c. NPS 3 and NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.

2.03 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
    1. Standard-Pattern, Mechanical-Joint Fittings: AWWA C110, ductile or gray iron.
        a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.04 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

E. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.
    1. Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
    1. se PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.05 SPECIALTY VALVES [S]

A. Comply with requirements in Section 22 05 23"General-Duty Valves for Plumbing Piping" for general-duty metal valves.

B. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

2.06 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Capitol Manufacturing Company.
      b. Central Plastics Company.
      c. EPCO Sales, Inc.
      d. Hart Industries International, Inc.
      e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
      f. Zurn Plumbing Products Group; Wilkins Water Control Products.
   2. Description:
      a. Pressure Rating: [**150 psig**] [**250 psig**] at 180 deg F.
      b. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
      a. Capitol Manufacturing Company.
      b. Central Plastics Company.
      c. EPCO Sales, Inc.
      d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   2. Description:
      a. Factory-fabricated, bolted, companion-flange assembly.
      b. Pressure Rating: [**150 psig**] [**175 psig minimum**] [**300 psig**].
      c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Central Plastics Company.
      d. Pipeline Seal and Insulator, Inc.
   2. Description:
      a. Nonconducting materials for field assembly of companion flanges.
      b. Pressure Rating: [**150 psig**]
      c. Gasket: Neoprene or phenolic.
      d. Bolt Sleeves: Phenolic or polyethylene.
      e. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Calpico, Inc.
      b. Lochinvar Corporation.
   2. Description:
      a. Galvanized-steel coupling.
      b. Pressure Rating: 300 psig at 225 deg F .
      c. End Connections: Female threaded.
      d. Lining: Inert and noncorrosive, thermoplastic.

F. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Perfection Corporation; a subsidiary of American Meter Company.
   b. Precision Plumbing Products, Inc.
   c. Victaulic Company.
2. Description:
   a. Electroplated steel nipple complying with ASTM F 1545.
   b. Pressure Rating: [**300 psig at 225 deg F**] **temperature**>.
   c. End Connections: Male threaded or grooved.
   d. Lining: Inert and noncorrosive, propylene.

2.07 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Flex-Hose Co., Inc.
   2. Flexicraft Industries.
   3. Flex Pression, Ltd.
   4. Flex-Weld, Inc.
   5. Hyspan Precision Products, Inc.
   6. Mercer Rubber Co.
   7. Metraflex, Inc.
   8. Proco Products, Inc.
   9. Tozen Corporation.
   10. Unaflex, Inc.
   11. Universal Metal Hose; a Hyspan company

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
   1. Working-Pressure Rating: Minimum [**200 psig**] [**250 psig**].
   2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
   3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

2.08 WATER METERS [S[[O/M]

A. Displacement-Type Water Meters:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
      a. AALIANT; a Venture Measurement Product Line.
      b. ABB.
      c. Badger Meter, Inc.
      d. Carlon Meter.
      e. Mueller Company; Water Products Division.
      f. Schlumberger Limited; Water Division.
      g. Sensus Metering Systems.
   2. Description:
      a. Standard: AWWA C700.
      b. Pressure Rating: 150-psig working pressure.
      c. Body Design: Nutating disc; totalization meter.
      d. Registration: In gallons or cubic feet as required by utility.
      e. Case: Bronze.
      f. End Connections: Threaded.

B. Turbine-Type Water Meters:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. AALIANT; a Venture Measurement Product Line.

b. ABB.
c. Badger Meter, Inc.
d. Hays Fluid Controls.
e. Master Meter, Inc.
f. McCrometer.
g. Mueller Company; Water Products Division.
h. Schlumberger Limited; Water Division.
i. SeaMetrics Inc.
j. Sensus Metering Systems.

2. Description:
   a. Standard: AWWA C701.
   b. Pressure Rating: [**150-psig**] <**Insert pressure**> working pressure.
   c. Body Design: Turbine; totalization meter.
   d. Registration: In gallons or cubic feet as required by utility company.
   e. Case: Bronze.
   f. End Connections for Meters NPS 2 and Smaller: Threaded.
   g. End Connections for Meters NPS 2-1/2 and Larger: Flanged.

C. Compound-Type Water Meters:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
   a. ABB.
   b. Badger Meter, Inc.
   c. Master Meter, Inc.
   d. Mueller Company; Water Products Division.
   e. Schlumberger Limited; Water Division.
   f. Sensus Metering Systems.
   g. <**Insert manufacturer's name**>.
2. Description:
   a. Standard: AWWA C702.
   b. Pressure Rating: 150-psig working pressure.
   c. Body Design: With integral mainline and bypass meters; totalization meter.
   d. Registration: In gallons or cubic feet as required by utility company.
   e. Case: Bronze.
   f. Pipe Connections: Flanged.

D. Fire-Service-Type Water Meters:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Badger Meter, Inc.
   b. Mueller Company; Water Products Division.
   c. Schlumberger Limited; Water Division.
   d. Sensus Metering Systems.
   e. <**Insert manufacturer's name**>.
2. Description:
   a. Standard: AWWA C703 and UL listing.
   b. Pressure Rating: 175-psig working pressure.
   c. Body Design:
      1) Proportional, Detector-Type Water Meters: With meter on bypass.
         a) Bypass Meter: [**AWWA C701, turbine**] [**AWWA C702, compound**] type with bronze case; size not less than one-half nominal size of main-line meter.
      2) Turbine-Type Water Meters: With strainer, and with meter on bypass.
         a) Strainer: Full size, matching water meter.
         b) Bypass Meter: AWWA C701, turbine type with bronze case; not less than NPS 2.

d. Registration: In gallons or cubic feet as required by utility company.
e. Case: Bronze.
f. Pipe Connections for Meters NPS 2 and Smaller: Threaded.
g. Pipe Connections for Meters NPS 2-1/2 and Larger: Flanged.

E. Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

F. Remote Registration System: Encoder type complying with AWWA C707; modified with signal transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Comply with requirements in **[Section 22 04 00 "General Requirements for Plumbing"] Section 31 20 00 "Earth Moving"** for excavating, trenching, and backfilling.

3.02 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for pressure gages, drain valves and strainers.

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for pressure-reducing valves.

G. Install domestic water piping level [**with 0.25 percent slope downward toward drain**] [**without pitch**] and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install seismic restraints on piping. Comply with requirements in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

K. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

M. Install piping adjacent to equipment and specialties to allow service and maintenance.

N. Install piping to permit valve servicing.

O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

P. Install piping free of sags and bends.

Q. Install fittings for changes in direction and branch connections.

R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

S. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Section "22 11 19 “Domestic Water Piping Specialties” for pressure gages.

T. Install thermostats in hot-water circulation piping. Comply with requirements in Section 22 11 23"Domestic Water Pumps" for thermostats.

U. Install thermometers at inlet of hot water circulating pump and outlet piping from each water heater. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for thermometers.

V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 04 00 "General Requirements for Plumbing."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 04 00 "General Requirements for Plumbing."

3.03 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

F. Copper-Tubing, Push-on Joints: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.

G. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

H. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
   2. CPVC Piping: Join according to ASTM D 2846 Appendix.
   3. PVC Piping: Join according to ASTM D 2855.

J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.04 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Section 22 05 23 "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 and smaller. Use ball or gate valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Section 22 11 19 "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for balancing valves.

3.05 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 1-1/2 and Smaller: Fitting-type coupling.
2. NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition [**fittings**] [**or**] [**unions**].

3.06 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.

3.07 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water booster pump.

B. Install bronze-hose flexible connectors in copper domestic water tubing.

3.08 WATER METER INSTALLATION

A. Rough-in domestic water piping [**for water meter installation**] [**, and install water meters**] according to utility company's requirements.

B. Water meters will be furnished and installed by utility company.

C. Install water meters according to AWWA M6, utility company's requirements, and the following:

D. Install displacement-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.

E. Install turbine-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.

F. Install compound-type water meters with shutoff valves on water-meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.

G. Install fire-service water meters with shutoff valves on water-meter inlet and outlet and on full-size valved bypass around meter. Support meter, valves, and piping on brick or concrete piers.

H. Install remote registration system according to standards of utility company and of authorities having jurisdiction.

3.09 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

B. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
   1. Vertical Piping: MSS Type 8 or 42, clamps.
   2. Individual, Straight, Horizontal Piping Runs:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
      c. Longer Than 100 Feet If Indicated: MSS Type 49, spring cushion rolls.
   3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
   2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
   3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   4. NPS 2-1/2: 108 inches with 1/2-inch rod.
   5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
   2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
   3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
   4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

H. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

I. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.
   2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
   4. NPS 6: 48” with 3/4” rod.

J. Install supports for vertical PVC piping every 48 inches.

K. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.10 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.11 IDENTIFICATION

A. Identify system components. Comply with requirements Section 22 05 53 "Painting and Identification for Plumbing Piping and Equipment" for identification materials and installation.

B. Label pressure piping with system operating pressure.

3.12 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow

to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.13 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water return piping to provide adequate flow at indicated hot water temperature, at all times to point where hot water return pipe connects to hot water pipe.
    a. Manually adjust balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.14 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:
        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to testing agency for testing. Repeat procedures if biological examination shows contamination.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to testing agency for testing. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.15 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building service piping, [**NPS 3 and smaller**] shall be the following:

1. Hard or Soft copper tube, **ASTM B 88, Type K**; **wrought-copper solder-joint fittings; and brazed copper pressure-seal fittings; and pressure-sealed**] joints.
2. PVC, [**Schedule 40 pipe; PVC, Schedule 40**] [**Schedule 80 pipe; PVC, Schedule 80**] socket fittings; and solvent-cemented joints.

E. Under-building-slab, domestic water, building-service piping, [**NPS 4 and larger],** shall be the following:

1. Mechanical-joint, ductile-iron pipe; standard pattern mechanical-joint fittings; and mechanical joints.

F. Under-building-slab, domestic water piping, **NPS 2** and smaller, shall be the following:

1. [**Hard or soft**] copper tube, ASTM B 88, Type K; **wrought-copper solder-joint fittings; and brazed copper pressure-seal-joint fittings; and pressure-sealed** joints.

Aboveground domestic water piping, shall be the following:

2. Hard copper tube, ASTM B 88, Type cast-or wrought- copper solder-joint fittings; and **soldered**] joints.
3. Hard copper tube, ASTM B 88, Type L copper pressure-seal-joint fittings; and pressure-sealed joints.
4. Hard copper tube, ASTM B 88, Type L; copper push-on-joint fittings; and push-on joints.

3.16 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller. Use ball, or gate valves for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use ball or globe valves Hot-Water Circulation Piping, Balancing Duty: Calibrated Memory-stop balancing valves.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated, Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

D. CPVC and PVC valves matching piping materials may be used.

END OF SECTION

SECTION 22 1119

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:

1. Backflow Prevention Devices
2. Water Pressure-Reducing Valves.
3. Balancing Valves.
4. Temperature-Actuated Water Mixing Valves.
5. Strainers.
6. Hose Stations.
7. Hose Bibbs.
8. Sill Cocks.
9. Drain Valves.
10. Water Hammer Arresters.
11. Air Vents.
12. Trap-Seal Primer Valves.
13. Trap-Seal Primer Systems.
14. Thermometers
15. Pressure Gages

1.03 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: **125 psig**, unless otherwise indicated.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For domestic water piping specialties indicated [O/M], include in emergency, operation, and maintenance manuals. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. NSF Compliance for materials that will come in contact with potable water:

1. NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
2. NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."
3. NSF 372, "Drinking Water System Components - Lead Content."

PART 2 - PRODUCTS

2.01 BACKFLOW PREVENTION DEVICES [S] [O/M]

A. Backflow Prevention Devices: All equipment subject to backflow or back siphonage such as, but not limited to **Water Service,Watering Systems**etc., shall be equipped with Backflow Prevention Devices to satisfy the requirements of the [**International Plumbing Code**,] all local codes and ordinances.

B. Pressure Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following: **Conbraco model 4V-500, Watts's model 800M4QTFR, Wilkins model 420**.
2. Standard: ASSE 1020.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: [**5 psig**] maximum, through middle 1/3 of flow range.
5. Size:
6. Design Flow Rate:
7. Selected Unit Flow Range Limits:
8. Pressure Loss at Design Flow Rate:
9. Accessories:
    a. Valves: Ball type, on inlet and outlet.

C. Intermediate Atmospheric-Vent Backflow Preventers for use in water lines serving **Clothes Washer**:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following: **Conbraco model 40-400, Watts model 90 Wilkins model 760.**
2. Standard: ASSE 1012.
3. Operation: Continuous-pressure applications.
4. Size: **NPS ½**
5. Body: Bronze.
6. End Connections: Union, solder joint.
7. Finish: Rough bronze.

D. Reduced-Pressure-Principle Backflow Preventers for use in **Water Service**

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following: **Conbraco model 40-210-A2, Watts model 909QTS.Wilkins**
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: **12 psig** maximum, through middle 1/3 of flow range.
5. Size: **[NPS 3/4] [NPS 1]**
6. Body: Bronze
7. End Connections: Threaded.
8. Configuration: Designed for horizontal, straight through flow.
9. Accessories:
    a. Valves: Ball type with threaded ends on inlet and outlet.
    b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.
    c. Strainer: On inlet.

2.02 BALANCING VALVES [S] [O/M]

A. Copper-Alloy Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **Bell & Gossett "Circuit Setter Plus" model CB, Nibco 1710, Watts CSM-61-M1,**
2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
3. Body: Brass or bronze,

4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

B. Cast-Iron Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**: ITT Bell & Bossett "Circuit Setter", Nibco 737, Watts CSM-81-F,**
2. Type: Adjustable with Y-pattern globe valve, two readout ports, and memory-setting indicator.
3. Size: Same as connected piping, but not smaller than NPS 2-1/2.

C. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.03 TEMPERATURE-ACTUATED WATER MIXING VALVES [S] [O/M]

A. Tempering Valve TV:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Lawler Manufacturing Company, Inc.
   b. Leonard Valve Company.
   c. Powers; a Watts Industries Co.
   d. Symmons Industries, Inc.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig.
4. Type: [**Exposed-mounting**]thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Valve Pressure Rating: 125 psig minimum, unless otherwise indicated.
9. Tempered-Water Setting: <**Insert deg F.**>
10. Tempered-Water Design Flow Rate: TBD
11. Selected Valve Flow Rate at 45-psig Pressure Drop: TBD
12. Pressure Drop at Design Flow Rate: 10 **psig.**>
13. Valve Finish: [**Chrome plated**]
14. Piping Finish: [**Chrome plated**]
15. Cabinet: Factory-fabricated, stainless steel, for [**recessed**] mounting and with hinged, stainless-steel door.

B. Tempering Valve Manifold TVM:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Leonard Valve Company.
   b. Powers; a Watts Industries Co.
   c. Symmons Industries, Inc.
2. Description: Factory-fabricated, [**exposed-mounting**], thermostatically controlled, water-mixing-valve assembly in [**two**] valve parallel arrangement.
3. Large-Flow Parallel: Thermostatic water mixing valve and downstream pressure regulator with pressure gages on inlet and outlet.
4. Intermediate-Flow Parallel: Thermostatic water mixing valve and downstream pressure regulator with pressure gages on inlet and outlet.
5. Small-Flow Parallel: Thermostatic water mixing valve.
6. Thermostatic Mixing Valves: Comply with ASSE 1017. Include check stops on hot- and cold-water inlets and shutoff valve on outlet.
7. Water Regulator(s): Comply with ASSE 1003. Include pressure gage on inlet and outlet.
8. Component Pressure Ratings: 125 psig minimum, unless otherwise indicated.
9. Cabinet: Factory-fabricated, stainless steel, for [**recessed**] [**surface**] mounting and with hinged, stainless-steel door.

10. Selected Large Flow, Tempered Water Valve Size: <**Insert size**>
11. Tempered-Water Setting: <**Insert deg F**>
12. Unit Tempered-Water Design Flow Rate: <**Insert gpm.**>
13. Unit Minimum Tempered-Water Design Flow Rate: <**Insert gpm**>
14. Selected Unit Flow Rate at 45-psig Pressure Drop: <**Insert gpm**>
15. Unit Pressure Drop at Design Flow Rate: 10 **psig.**>
16. Unit Tempered-Water Outlet Size: <**Insert NPS**> end connection.
17. Unit Hot- and Cold-Water Inlet Size: <**Insert NPS** > end connections.
18. Thermostatic Mixing Valve and Water Regulator Finish: [**Chrome plated,**]
19. Piping Finish: [**Chrome plated**]

2.04 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers
   1. Pressure Rating: 125 psig minimum, unless otherwise indicated.
   2. Body: Bronze for NPS 2 and smaller; cast iron [**with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and**] for NPS 2-1/2 and larger.
   3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
   4. Screen: Stainless steel with round perforations, unless otherwise indicated.
   5. Perforation Size:
      a. Strainers NPS 2 and Smaller: [**0.020 inch**]
      b. Strainers NPS 2-1/2 to NPS 4: [**0.045 inch**]
   6. Drain: **, hose-end drain valve**].

2.05 OUTLET BOXES [S]

A. Laundry Outlet LO-1: Refer to Detail on Drawings
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **Guy Gray model WBE-200,**
   2. Mounting: Recessed.
   3. Material and Finish: Epoxy painted steel box and faceplate.
   4. Faucet: Combination, valved fitting, complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlet.
   5. Drain: **NPS 2** Standpipe and P-trap for direct waste connection to drainage piping.
   6. Receptacle: 20 AMP, Duplex Grounding.

B. Icemaker Outlet Boxes IMB-1:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**: Guy Gray model BIM 875,**
   2. Mounting: Recessed.
   3. Material and Finish: Epoxy-painted-steel box and faceplate.
      Shutoff: NPS 1/2 compression angle valve with NPS ¼ outlet smaller copper tube outlet.

2.06 HOSE BIBBS [S] [

A. Hose Bibbs:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Hose Bibbs in Toilets: **Chicago No. 293 LK, T&S B-0717, Zurn Z-81307,** loose key, chrome plated, 1/2" size, with wall flange. **Watts No. 8AC, Chicago E-27, T&S BL-5550-10,** vacuum breaker.
      b. Hose Bibbs in Other Finished Areas Inside Building**: Chicago No. 15, T&S B-0717** with wall flange, furnished with lever or cross handle chrome plated, 3/4" inlet, **Chicago E-27, T&S BL-5550-10, Watts No. 8AC** vacuum breaker.
      c. Hose Bibbs in Equipment Rooms and Unfinished Areas Inside Building: **Chicago No. 387-LF, T&S B-0731-RGH, Zurn Z-80701**, rough chrome plated, wheel, cross, or

lever handle, 3/4" size. **Watts No. 8AC Chicago E-27, T&S BL-5550-10,** vacuum breaker.

d. Hose Bibbs at Mop Sink: **Chicago No. 952-CP, T&S B-0720, No. Z-875L7**, wall flange, integral vacuum breaker, chrome plated, 3/4" size, not threaded outlet lever or key handle.

2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.
8. Vacuum Breaker: Integral [**or field-installation,**] non-removable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
9. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
10. Finish for Service Areas: [**Rough bronze**] [
11. Finish for Finished Rooms: Chrome or nickel plated.
12. Operation for Equipment Rooms: Wheel handle or operating key.
13. Operation for Service Areas: **Operating key**.
14. Operation for Finished Rooms: [**Operating key**].
15. Include operating key with each operating-key hose bibb.
16. Include [**integral**] wall flange with each chrome- or nickel-plated hose bibb.

2.07 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves :

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.
10. Vacuum Breaker: Integral [**or field-installation,**] non-removable, drainable, hose-connection vacuum breaker complying with ASSE 1011.

B. Stop-and-Waste Drain Valves:

1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
2. Pressure Rating: 200-psig minimum CWP or Class 125.
3. Size: NPS 3/4.
4. Body: Copper alloy or ASTM B 62 bronze.
5. Drain: NPS 1/8 side outlet with cap.

2.08 WATER HAMMER ARRESTERS (SHOCK ABSORBERS) [S]

A. Water Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AMTROL, Inc.
   b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   c. Tyler Pipe; Wade Div.
   d. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: [[**Copper tube with piston**].
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.09 AIR VENTS [S]

A. Bolted-Construction Automatic Air Vents :
   1. Body: Bronze.
   2. Pressure Rating: 125-psig minimum pressure rating at 140 deg F.
   3. Float: Replaceable, corrosion-resistant metal.
   4. Mechanism and Seat: Stainless steel.
   5. Size: [**NPS 3/8**] [**NPS 1/2**] minimum inlet.
   6. Inlet and Vent Outlet End Connections: Threaded.

B. Welded-Construction Automatic Air Vents :
   1. Body: Stainless steel.
   2. Pressure Rating: 150-psig minimum pressure rating.
   3. Float: Replaceable, corrosion-resistant metal.
   4. Mechanism and Seat: Stainless steel.
   5. Size: NPS 3/8 minimum inlet.
   6. Inlet and Vent Outlet End Connections: Threaded.

2.10 FILLED-SYSTEM THERMOMETERS [S]

A. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Ashcroft Inc.
      b. Marsh Bellofram.
      c. Miljoco Corporation.
      d. Palmer Wahl Instrumentation Group.
      e. REOTEMP Instrument Corporation.
      f. Trerice, H. O. Co.
      g. Weiss Instruments, Inc.
   2. Standard: ASME B40.200.
   3. Case: Sealed type, cast aluminum or drawn steel; [**4-1/2-inch**] nominal diameter.
   4. Element: Bourdon tube or other type of pressure element.
   5. Movement: Mechanical, [**dampening type,**] with link to pressure element and connection to pointer.
   6. Dial: Non-reflective aluminum with permanently etched scale markings [0 **deg F to 200 deg f]**.
   7. Pointer: Dark-colored metal.
   8. Window: **Glass**
   9. Ring: [**Metal**]
   10. Connector Type(s): Union joint, **adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device** with ASME B1.1 screw threads.
   11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
      a. Design for Thermowell Installation: Bare stem.
   12. Accuracy: Plus or minus 1 percent of scale range.

2.11 PRESSURE GAGES [S]

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. AMETEK, Inc.; U.S. Gauge.
      b. Ashcroft Inc.
      c. Ernst Flow Industries.
      d. Flo Fab Inc.
      e. Marsh Bellofram.
      f. Miljoco Corporation.

g. Noshok.
h. Palmer Wahl Instrumentation Group.
i. REOTEMP Instrument Corporation.
j. Tel-Tru Manufacturing Company.
k. Trerice, H. O. Co.
l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
m. Weiss Instruments, Inc.
n. WIKA Instrument Corporation - USA.
o. Winters Instruments - U.S.

2. Standard: ASME B40.100.
3. Case: [**Sealed**] type(s); cast aluminum or drawn steel; [**4-1/2-inch]** nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in 0 psig to 160 psig, 20 psig figure intervals, 2psig graduation marks.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

B. Snubbers: ASME B40.100, brass; with NPS 1/4 ASME B1.20.1 pipe threads and piston porous-metal-type surge-dampening device. Include extension for use on insulated piping.

C. Valves: Brass ball with NPS 1/4, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with requirements in other Division 22 Sections for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction and the International Plumbing Code.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
3. Do not install bypass piping around backflow preventers.

C. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted. Adjust balancing valves to provide indicated temperature hot water at all times to point where the hot water return pipe connects to the hot water pipe.

E. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install thermometers and water regulators if specified.
2. Install cabinet-type units recessed in or surface mounted on wall as specified.

F. Water mixing valves shall be installed and piped as indicated in the manufacturer's recommendations for the application intended.

G. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve, solenoid valve, and pump.

H. Install outlet boxes recessed in wall with face plate flush with finished wall.

I. Install ground hydrants with 1 cu. yd. of crushed gravel around drain hole. Set ground hydrants with box flush with grade.

J. Install draining-type post hydrants with 1 cu. yd**.** of crushed gravel around drain hole. Set post hydrants in concrete paving or in 1 cu. ft. of concrete block at grade.

K. Install water hammer arresters in water piping according to PDI-WH 201.

L. Install air vents at high points of water piping.

M. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

N. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

O. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

P. Install valve and snubber in piping for each pressure gage for fluids.

Q. Install test plugs in piping tees.

R. Install thermometers in the following locations:
   1. Outlet of each water heater.
   2. Inlets and outlets of each domestic water heat exchanger.
   3. Inlet and outlet of each domestic hot-water storage tank.
   4. Inlet of each hot water circulating pump.

S. Install pressure gages in the following locations:
   1. Building water service entrance into building.
   2. Inlet and outlet of each pressure-reducing valve.
   3. Suction and discharge of each domestic water booster pump.

3.02 CONNECTIONS

A. Comply with requirements, for piping installation, in Sections 22 11 16 “Domestic Water Piping”. Drawings indicate general arrangement of piping and specialties.

B. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Section 26 05 23 "Low-Voltage Electrical Power Conductors and Cables."

D. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.03 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following: Comply with requirements in Section 22 05 53 “Painting and Identification for Plumbing Piping and Equipment.
   1. Intermediate atmospheric-vent backflow preventers.
   2. Reduced-pressure-principle backflow preventers.
   3. Double-check backflow-prevention assemblies.
   4. Water pressure-reducing valves.
   5. Primary, thermostatic, water mixing valves.
   6. Manifold, thermostatic, water-mixing-valve assemblies.
   7. Photographic-process, thermostatic, water-mixing-valve assemblies.

8. Primary water tempering valves.
9. Outlet boxes.
10. Hose stations.
11. Supply-type, trap-seal primer valves.
12. Trap-seal primer systems.

3.04 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:
   1. Test each **pressure vacuum breaker reduced-pressure-principle backflow preventer**] according to authorities having jurisdiction and the device's reference standard.
   2. Test results shall be recorded on forms approved or provided by **engineer**

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.05 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

D. Adjust faces of thermometers and pressure gages to proper angle for best visibility.

END OF SECTION

SECTION 22 1123

DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. In-line, sealless centrifugal pumps.

1.03 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

B. DDC: Direct Digital Control

1.04 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Include materials of construction, rated capacities, certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

B. Operation and Maintenance Data: For domestic water pumps indicated [O/M], to include in operation and maintenance manuals. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing.

1.05 QUALITY ASSURANCE

A. 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.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

C. NSF Compliance for materials that will come in contact with potable water:
   1. NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."
   2. NSF 372, "Drinking Water System Components- Lead Content."

PART 2 - PRODUCTS

2.01 IN-LINE, SEALLESS HOT WATER CIRCULATING PUMPS[S] [O/M]

A. HWCP No.<**insert number**>: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following:
   1. Armstrong Pumps Inc.
   2. Bell & Gossett Domestic Pump; ITT Corporation.
   3. Grundfos Pumps Corp.
   4. TACO Incorporated.
   5. WILO USA LLC - WILO Canada Inc.

B. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps.

C. Pump Construction:

1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
2. Casing: Bronze, with threaded or companion-flange connections.
3. Impeller: Plastic.
4. Motor: Single speed, unless otherwise indicated.

D. Capacities and Characteristics:

1. Capacity: <**Insert gpm**>.
2. Total Dynamic Head: <**Insert feet**>.
3. Minimum Working Pressure: 125 psig.
4. Maximum Continuous Operating Temperature: 220 deg F.
5. Inlet and Outlet Size: <**Insert NPS**>.
6. Pump Speed: <**Insert rpm**>.
7. Pump Control: [**DDC**] [**Pressure switch**] [**Thermostat**] [**Timer**].
8. Motor Horsepower: <**Insert value**>.
9. Electrical Characteristics:
   a. Volts: 120.
   b. Phases: Single.
   c. Hertz: 60.
   d. Full-Load Amperes: <**Insert value**>.

2.02 CONTROLS

A. Direct Digital Control: Comply with requirements in Section 23 09 00 “Instrumentation and Control for HVAC”.

B. Thermostats: Electric; adjustable for control of [**hot-water circulation**] pump.

1. Type: Water-immersion temperature sensor, for installation in piping.
2. Range: [**50 to 125 deg F**]
3. Enclosure: NEMA 250,
4. Operation of Pump: On or off.
5. Transformer: Provide if required.
6. Power Requirement: [**24 V, ac**] [**120 V, ac**] <
7. Settings: Start pump at [**105 deg F**]

C. Timers: Electric, for control of [**hot-water circulation**] pump.

1. Type: Programmable, [**seven-day**] <**Insert time**> clock with manual override on-off switch.
2. Enclosure: NEMA 250, [**Type 1**] <**Insert type**>.suitable for wall mounting.
3. Operation of Pump: On or off.
4. Transformer: Provide if required.
5. Power Requirement: [**24 V, ac**] [**120 V, ac**]
6. Programmable Sequence of Operation: [**Up to two on-off cycles each day for seven days**]

D. Time-Delay Relays: Electric, for control of hot-water circulation pump between water heater and connected hot-water storage tank.

1. Type: Adjustable time-delay relay.
2. Range: Up to five minutes.
3. Setting: Five minutes.
4. Enclosure: NEMA 250,
5. Operation of Pump: On or off.
6. Transformer: Provide if required.
7. Power Requirement: [**24 V, ac**] [**120 V, ac**]
8. Programmable Sequence of Operation: Limit pump operation to periods of burner operation plus maximum five minutes after the burner stops.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of domestic-water-piping system to verify actual locations of connections before pump installation.

3.02 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Install in-line, sealless centrifugal pumps with shaft horizontal unless otherwise indicated.

C. Install horizontally mounted, in-line, centrifugal pumps with shaft(s) horizontal.

D. Install continuous-thread hanger rods and [**spring hangers**]] of size required to support pump weight.

1. Comply with requirements for vibration isolation devices in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment." Fabricate brackets or supports as required.
2. Comply with requirements for hangers and supports in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

E. Install thermostats in hot-water return piping.

F. Install timers [**control room**]

G. Install time-delay relays in piping between water heaters and hot-water storage tanks.

3.03 CONNECTIONS

A. Comply with requirements for piping in Section 22 11 16 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to pumps to allow service and maintenance.

C. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.

1. Comply with requirements for flexible connectors in Section 22 11 16 "Domestic Water Piping"
2. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as connected piping. Comply with requirements for valves specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping" and comply with requirements for strainers in Section 22 11 19 "Domestic Water Piping Specialties."
3. Install thermometer at inlet of each circulating pump and pressure gage. Comply with requirements for thermometers in Section 22 11 19 “Domestic Water Piping Specialties”.

D. Comply with Division 26 requirements for electrical connections, and wiring methods.

E. Connect [**DDC Controls**] [**thermostats,**] [**time-delay relays,**] [**and**] [**timers**] to pumps that they control.

F. Interlock pump between water heater and hot-water storage tank with water heater burner and time-delay relay.

3.04 IDENTIFICATION

A. Comply with requirements for identification in Section 22 05 53 "Painting and Identification for Plumbing Piping and Equipment" for identification of pumps.

3.05 STARTUP SERVICE

A. [**Perform**] startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Set [**DDC Controls,**] [**thermostats,**] [**timers,**] [**and**] [**time-delay relays**] for automatic starting and stopping operation of pumps.
5. Perform the following startup checks for each pump before starting:
   a. Verify bearing lubrication.
   b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
   c. Verify that pump is rotating in the correct direction.
6. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
7. Start motor.
8. Open discharge valve slowly.
9. Adjust temperature settings on thermostats.
10. Adjust timer settings.

3.06 ADJUSTING

A. Adjust domestic water pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION

SECTION 22 1316

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Pipe, tube, and fittings.
   2. Specialty pipe fittings.
   3. Encasement for underground metal piping.

1.03 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
   1. Soil, Waste, and Vent Piping: **10-foot head of water**.
   2. Waste, Force-Main Piping: **50 psig**] [**100 psig**] [**150 psig**] <**Insert pressure**>.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to SEI/ASCE 7 "Minimum Design Loads for Buildings and Other Structures".

1.04 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Comply with requirements in Division 01 and Section 22 04 00 "General Requirements for Plumbing".

B. LEED Submittal:
   1. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

C. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

D. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.06 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: **AB&I Foundry, Charlotte Pipe & Foundry or Tyler Pipe**. Cast iron pipe and fittings shall be manufactured in the USA bear the Collective Trademark of the Cast Iron Soil Pipe Institute.

B. Pipe and Fittings: ASTM A 74, **[Service]** **[and]** **[Extra Heavy]** class(es).

C. Gaskets: ASTM C 564, rubber.

D. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.03 SPECIALTY PIPE FITTINGS

A. Transition Couplings:
   1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
   2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
   3. Unshielded, Nonpressure Transition Couplings:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Dallas Specialty & Mfg. Co.
         2) Fernco Inc.
         3) Mission Rubber Company; a division of MCP Industries, Inc.
         4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
      b. Standard: ASTM C 1173.
      c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
      d. Sleeve Materials:
         1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
         2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
         3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
   4. Shielded, Nonpressure Transition Couplings:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Cascade Waterworks Mfg. Co.
         2) Mission Rubber Company; a division of MCP Industries, Inc.
      b. Standard: ASTM C 1460.

c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:
   a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) Cascade Waterworks Mfg. Co.
      2) Dresser, Inc.
      3) EBAA Iron, Inc.
      4) JCM Industries, Inc.
      5) Romac Industries, Inc.
      6) Smith-Blair, Inc.; a Sensus company.
      7) The Ford Meter Box Company, Inc.
      8) Viking Johnson.
   b. Standard: AWWA C219.
   c. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
   d. Center-Sleeve Material: [**Manufacturer's standard**]
   e. Gasket Material: Natural or synthetic rubber.
   f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:
   1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
   2. Dielectric Unions:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Capitol Manufacturing Company.
         2) Central Plastics Company.
         3) Hart Industries International, Inc.
         4) Jomar International Ltd.
         5) Matco-Norca, Inc.
         6) McDonald, A. Y. Mfg. Co.
         7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
         8) Wilkins; a Zurn company.
      b. Description:
         1) Standard: ASSE 1079.
         2) Pressure Rating: [**125 psig minimum at 180 deg F**]
         3) End Connections: Solder-joint copper alloy and threaded ferrous.
   3. Dielectric Flanges:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Capitol Manufacturing Company.
         2) Central Plastics Company.
         3) Matco-Norca, Inc.
         4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
         5) Wilkins; a Zurn company.
      b. Description:
         1) Standard: ASSE 1079.
         2) Factory-fabricated, bolted, companion-flange assembly.
         3) Pressure Rating: [**125 psig minimum at 180 deg F**]

4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.01 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in **[Section 22 04 00 "General Requirements for Plumbing"] Section 31 20 00 "Earth Moving**.

3.02 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2 and smaller; 1 percent downward in direction of flow for piping NPS 3 and larger.

2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Install steel piping according to applicable plumbing code.

P. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

Q. Install underground [**ABS**] [**and**] [**PVC**] piping according to ASTM D 2321.

R. Install force mains at elevations indicated.

S. Plumbing Specialties:
   1. Install backwater valves in sanitary waste gravity-flow piping. Comply with requirements for backwater valves in Division 22 Section "Sanitary Waste Piping Specialties."
   2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. **[Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.]** Comply with requirements for cleanouts in Section 22 04 00 “General Requirements for Plumbing”.
   3. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains in Section 22 13 19 "Sanitary Waste Piping Specialties."

T. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves in Section 22 04 00 “General Requirements for Plumbing”.

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons in Section 22 04 00 “General Requirements for Plumbing”.

3.03 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Joints for hubless, cast-iron soil pipes and fittings shall conform to CISPI 310 , latest revision and be certified by NSF for compliance to CISPI 310.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

G. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
   3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.04 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:
   1. Install transition couplings at joints of piping with small differences in OD's.
   2. In Drainage Piping: [**Unshielded**] [**Shielded**], nonpressure transition couplings.
   3. In Aboveground Force Main Piping: Fitting-type transition couplings.
   4. In Underground Force Main Piping:
      a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
      b. NPS 2 and Larger: Pressure transition couplings.

B. Dielectric Fittings:
   1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.05 VALVE INSTALLATION

A. Comply with requirements for general valve installation in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves:
   1. Install shutoff valve on each sewage pump discharge.
   2. Install gate or full-port ball valve for piping NPS 2 and smaller.
   3. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.
   1. Horizontal Piping: Horizontal backwater valves.[**Use normally closed type unless otherwise indicated.**]
   2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
   3. Install backwater valves in accessible locations.
   4. Comply with requirements for backwater valves in Section 22 13 19 "Sanitary Waste Piping Specialties."

3.06 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
   1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
   2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
   3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
   4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
   5. Vertical Piping: MSS Type 8 or Type 42, clamps.
   6. Install individual, straight, horizontal piping runs:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
      c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
   7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting [**, valve,**] and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2: 108 inches with 3/8-inch rod.
2. NPS 2: 10 feet with 3/8-inch rod.
3. NPS 2-1/2: 11 feet with 1/2-inch rod.
4. NPS 3: 12 feet with 1/2-inch rod.
5. NPS 4 and NPS 5 12 feet with 5/8-inch rod.
6. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
7. NPS 10 and NPS 12: 12 feet with 7/8-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
2. NPS 2-1/2: 108 inches with 1/2-inch rod.
3. NPS 3 and NPS 5: 10 feet with 1/2-inch rod.
4. NPS 6: 10 feet with 5/8-inch rod.
5. NPS 8: 10 feet with 3/4-inch rod.

K. Install supports for vertical copper tubing every 10 feet.

L. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.07 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by the plumbing code.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in stacks near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves [**with cleanout cover flush with floor**] [**in pit with pit cover flush with floor**]
6. Comply with requirements for [**cleanouts**] [**and**] [**drains**] specified in Section 22 13 19 "Sanitary Waste Piping Specialties."
7. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.

2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:
   1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.08 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification in Section 22 05 53 "Painting and Identification for Plumbing Piping and Equipment."

3.09 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to plumbing code:
   1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
   2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   3. Drainage and Vent Water Test: A water test shall be applied to the drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test, and each section shall be filled with water, but no section shall be tested with less that 10-foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested so that no joint or pipe in the building , except the uppermost 10 feet of the system, shall have been submitted to a test of less than 10-foot head of water. This pressure shall be held for at least 15 minutes. The system shall then be tight at all points.
   4. Drainage and Vent Air Test: An air test shall be made by forcing air into the system until there is a uniform gauge pressure of 5 psi or sufficient to a balance a 10 inch column of mercury. This pressure shall be held for a test period of at least 15 minutes. Any adjustments to the test pressure required because of changes in ambient temperature or the seating of gaskets shall be made prior to the beginning of the test period. **Plastic piping shall not be tested with air unless manufacturer literature states air testing is acceptable.**
   5. Drainage and Vent Final Test: The final test of the completed drainage and vent system shall be visual and in sufficient detail to determine compliance with the provisions of the plumbing code. Where a smoke test is utilized, it shall be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof, the

stack openings shall be closed and pressure equivalent to a 1-inch water column shall be held for a test period of not less than 15 minutes.

6. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
7. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be[**any of**] the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings [**CISPI]** hubless-piping couplings; and coupled joints.

C. Aboveground, soil and waste piping NPS 5 and larger shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; [**CISPI**] [**heavy-duty**] hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: [**Unshielded**] nonpressure transition couplings.

D. Aboveground, vent piping NPS 4 and smaller shall bethe following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; [**CISPI**] hubless-piping couplings; and coupled joints.
3. Galvanized-steel pipe, drainage fittings, and threaded joints.
4. Copper DWV tube, copper drainage fittings, and soldered joints.
5. Dissimilar Pipe-Material Couplings: [**Unshielded**] nonpressure transition couplings.

E. Aboveground, vent piping NPS 5 and larger shall bethe following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; [**CISPI**] hubless-piping couplings; and coupled joints.
3. Galvanized-steel pipe, drainage fittings, and threaded joints.

F. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:

1. In Kitchens, Boiler Rooms and other areas where equipment discharge temperature is above 140 degrees F. or noted “CI” on the drawings [**Extra Heavy**] [**Service**] class, cast-iron soil piping; [**gaskets; and gasketed**] [**calking materials; and calked**] joints.

2. Solid wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
3. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: [**Unshielded**], nonpressure transition couplings.

G. Underground, soil and waste piping NPS 5 and larger shall be[**any of**] the following:
1. In Kitchens, Boiler Rooms and other areas where equipment discharge temperature is above 140 degrees F. or noted “CI” on the drawings **Extra Heavy**] [**Service**] class, cast-iron soil piping; [**gaskets; and gasketed**] [**calking materials; and calked**] joints.
2. Solid-wall PVC pipe; PVC socket fittings; and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: [**Unshielded**] [**Shielded**], nonpressure transition couplings.

H. Aboveground sanitary-sewage force mains NPS 1-1/2 and NPS 2 shall be the following:
1. Hard copper tube, Type L; copper pressure fittings; and soldered joints.
2. Galvanized-steel pipe, pressure fittings, and threaded joints.

I. Aboveground sanitary-sewage force mains NPS 2-1/2 to NPS 6 shall be the following:
1. Hard copper tube, Type L; copper pressure fittings; and soldered joints.
2. Galvanized-steel pipe, pressure fittings, and threaded joints.
3. Grooved-end, galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.

J. Underground sanitary-sewage force mains NPS 4 and smaller shall be[**any of**] the following:
1. [**Hard**] [**Soft**] copper tube, Type K; [**wrought-** copper pressure fittings; and soldered joints.
2. Ductile-iron, mechanical-joint piping and mechanical joints.
3. Ductile-iron, push-on-joint piping and push-on joints.
4. Fitting-type transition coupling for piping smaller than NPS 1-1/2 and pressure transition coupling for NPS 1-1/2 and larger if dissimilar pipe materials.

K. Underground sanitary-sewage force mains NPS 5 and larger shall be the following:
1. Ductile-iron, mechanical-joint piping and mechanical joints.
2. Ductile-iron, push-on-joint piping and push-on joints.
3. Pressure transition couplings if dissimilar pipe materials.

END OF SECTION

SECTION 22 1319

SANITARY WASTE PIPING SPECIALITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:
   1. Backwater valves.
   2. Cleanouts.
   3. Floor drains.

1.03 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FOG: Fats, oils, and greases.

C. FRP: Fiberglass-reinforced plastic.

D. HDPE: High-density polyethylene plastic.

E. PE: Polyethylene plastic.

F. PP: Polypropylene plastic.

G. PVC: Polyvinyl chloride plastic.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”:

B. Seismic Qualification Certification for Sanitary drainage piping accessories and components from manufacturer:
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
      a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
      b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
   2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For drainage piping specialties indicated [O/M], to include in emergency, operation, and maintenance manuals. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

1.05 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.06 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate size and location of roof penetrations.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cultures: Provide 1-gal. bottles of bacteria culture recommended by manufacturer of FOG disposal systems equal to [**200**] <**Insert number**> percent of amount installed, but no fewer than [**2**] <**Insert number**> 1-gal. bottles.

PART 2 - PRODUCTS

2.01 CLEANOUTS [S]

A. Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but not limited to the following:
   a. Interior Finished Areas: **Josam 57000-22, Jay R. Smith, 4033L, Zurn ZN-1400**, Nickel bronze top.
   b. Interior Finished Areas: **Josam 58460-A, Jay R. Smith 4333C, Zurn ZN-1454**, Nickel bronze top, flashing flange.
   c. Interior Equipment Rooms and Concrete Floors of Unfinished Areas on Grade: **Josam 57000-X-CI-22, Jay R. Smith 4231, Zurn Z-1400 HD** cast iron frame and cover.
   d. Interior Equipment Rooms and Unfinished Spaces Above Slab on Grade: **Josam 58460A, Jay R. Smith 4333, Zurn Z-1455**, Cast iron frame and cover, flashing flange.
   e. Interior Equipment Rooms with Isolation Slabs Above Structural Slab: **Josam series 2900 drain body with pipe extension and 57000-X-CI-22 cleanout, Jay R. Smith No. 9350, Zurn Z-626, c**ast iron construction, elastomeric gaskets.
2. Standard: ASME A112.36.2M. **Cleanouts shall be manufactured in the USA.**
3. Size: Same as connected branch or as indicated on the Drawing.
4. Type**] [Cast-iron soil pipe with cast-iron ferrule]**
5. Body or Ferrule Material: Cast iron.
6. Clamping Device: **[Required].**
7. Outlet Connection: **Gasket] [Threaded].**
8. Closure: Brass plug with tapered threads.
9. Adjustable Housing Material**: [Cast iron]**
10. Frame and Cover Material and Finish: Nickel-bronze, copper alloy, Painted cast iron or Polished bronze.
11. Frame and Cover Shape: Round.
12. Top-Loading Classification: [**Extra-Heavy Duty**]
13. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

B. Base of Exposed Vertical Stacks Near Floor:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **Josam 48910, Jay R. Smith 4505Y, Wade 8560E, Zurn Z-1445.**

2. Standard: ASME A112.36.2M and ASTM A74, ASTM A888, or CISPI 301, for cleanout test tees. **Cleanouts shall be manufactured in the USA.**
3. Size: Same as connected drainage piping.
4. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch or hubless, cast-iron soil-pipe test tee as required to match connected piping.
5. Closure Plug: Countersunk, brass.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

C. Wall Cleanouts:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but not limited to, the following:
   a. Painted Drywall and Finished Masonry Walls: **Josam 58600-PLG, Jay R. Smith 4472, Zurn Z-1468.**
   b. Plastered Walls: **Josam 58640, Jay R. Smith 4930-Smooth, Zurn ZN-1447**, Nickel bronze frame and cover.
2. Standard: ASME A112.36.2M, for cleanouts. Include wall access. **Cleanouts shall be manufactured in the USA.**
3. Size: Same as connected drainage piping.
4. Body Material: [**Hub-and-spigot, cast-iron soil-pipe T-branch**] [**Hubless, cast-iron soil-pipe test tee**] as required to match connected piping.
5. Closure: Countersunk, drilled-and-threaded, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

D. Outside Cleanouts:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **Josam 55000-X-22, Jay R. Smith 4233, Wade 6000-NH-X, Zurn Z-1400 NH.**
2. Standard: ASME A112.36.2M. **Cleanouts shall be manufactured in the USA.**
3. Size: Same as branch or as indicated on Drawings.
4. Type: Adjustable Housing
5. Body Material: Cast Iron.
6. Closure Plug Size: Brass with taper threads
7. Frame and Cover: Round Cast Iron
8. Top loading Classification: Heavy Duty.
9. Outlet: No-Hub or spigot.

2.02 FLOOR DRAINS [S]

A. General Requirements: Drains are listed to generally describe type and features and shall be modified and furnished as required herein, suitable for construction conditions.
1. Drains shall have one-piece bodies or the Contractor shall effectively seal drain bodies to prevent leakage from two-piece body drains.
2. Strainers shall be ¼" thick, or equivalent, nickel bronze in finished rooms and spaces.
3. Strainers shall be cast iron in equipment rooms, shops, unfinished storage rooms and janitors closets.
4. Strainer sizes shall be 5" for 2" drains, 7" for 3" drains, and 8" for 4" drains unless otherwise noted.
5. Provide flashing clamps for all floors with water-proofing membranes.
6. Drains located in Composition Decks, "Dex-O-Tex", or similar compositions floor surfaces shall be furnished with special 4" wide flanges for bonding the flooring surface to the strainer. The height of the top of strainer above the flange shall be determined and provided after coordinating with the flooring Contractor for thickness requirements.
7. Weepholes shall be eliminated in all drains where composition deck, "Dex-O-Tex", or waterproof floors are provided without waterproofing membrane.
8. Drain body shall be tapped for trap primer on floor drains equipped with trap primers.
9. **Floor drains shall be manufactured in the USA**

B. Cast-Iron Floor Drains :

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, of the following:
   a. Type A: **Josam 30000-A, Jay R Smith 2010-A, Wade 1100, Zurn ZN-415**, furnished where indicated on the drawings and for all finished areas not otherwise indicated.
   b. Type B: **Josam 32100-TG, Jay R Smith 2120, Wade 1310, Zurn Z-508**, deep flanged tractor grate which can be installed inverted to receive equipment drains.
   c. Type C: **Josam 37840, Jay R. Smith 2240, Wade 2370, Zurn Z-539-FY-T,** 12" square top, square sump, bottom outlet, sediment bucket, cast iron grate.
   d. Type D: **Josam 49580A-NB-4, Jay R. Smith 3060-13, Zurn ZN-1950-3**, 12" diameter receptor, enameled interior, dome strainer, nickel bronze rim, 3/4 nickel bronze grate.
   e. Type E: **Josam49520-A-LF-NB, Jay R. Smith 3060-10, Wade 9040, Zurn ZN-1950-1**, 8" diameter, 6" deep, enameled interior, dome strainer, nickel bronze rim, nickel bronze grate.
   f. Type<**insert designation**>: Same as Type E except furnished with depressed aluminum grate.
   g. Type <**insert designation**>: Similar to Type A, furnished with **Josam E1, Jay R. Smith S37, Wade ER7, Zurn I**, 7" adjustable nickel bronze extended rim strainer.
   h. Type<**insert designation**>: **Jay R Smith 2630C-NB, Wade 2370-1-27, Zurn ZN-566-TG,** 12" square top, square sump, sediment bucket nickel bronze grate.
   i. Type<**insert designation**>: **Josam 29000 drain body with pipe extension, and 32100 drain, Jay R. Smith 9340, Zurn Z-264**, for isolated floor slabs.
2. Standard: ASME A112.6.3.
3. Body Material: Gray iron.
4. Outlet: Bottom, caulk or soil pipe gasket.
5. Backwater Valve: As specified
6. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
7. Sediment Bucket: As specified.
8. Top or Strainer Material: Gray iron, Nickel bronze, or acid resisting enamel.
9. Top Shape: As specified.
10. Trap Material: Cast iron or PVC.
11. Trap Pattern: Standard P-trap.

C. Stainless-Steel Floor Drains :

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Type <**insert designation**>: **IMC-TEDDY Model No. ASFT-2430** floor trough, brush satin 14-gauge type 304 stainless steel construction, stainless steel strainer with 4" drain tailpiece, 24" x 30" x 6" size recessed grating flange, joints shall be leak proof. Provide with Model No. SG-2430 stainless steel subway grating sized to fit trough. Trough and grating shall be set flush with finished floor.
2. Outlet: Bottom.
3. Material: Stainless steel.
4. Top Shape: Rectangular.
5. Trap-Primer Connection: [Not required].
6. Trap Material: Cast iron.
7. Trap Pattern: Standard P-trap.

2.03 THROUGH-PENETRATION FIRESTOP ASSEMBLIES [S]

A. Through-Penetration Firestop Assemblies >:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ProSet Systems Inc.
   b. <**Insert manufacturer's name.**>
2. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.
3. Size: Same as connected soil, waste, or vent stack.

4. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
5. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
6. Special Coating: Corrosion resistant on interior of fittings.

2.04 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES [S]

A. Air-Gap Fittings
   1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
   2. Body: Bronze or cast iron.
   3. Inlet: Opening in top of body.
   4. Outlet: Larger than inlet.
   5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

B. Vent Caps:
   1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
   2. Size: Same as connected stack vent or vent stack.

2.05 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type and efficiency requirements for motors.
   1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
   2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 “Electrical”.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with requirements in other Division 22 Sections for piping joining materials, joint construction, and basic installation requirements.

B. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

C. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
   1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
   2. Locate at each change in direction of piping greater than 45 degrees.
   3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
   4. Locate at base of each vertical soil and waste stack.

D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor. Cleanouts on 6” and smaller pipes shall be provided a minimum clearance of 18” for rodding. Cleanouts on 8” and larger pipes shall be provided a minimum clearance of 36” for rodding.

E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
   1. Position floor drains for easy access and maintenance.
   2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
      a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
      b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
      c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
   3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
   4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

G. Install fixture air-admittance valves on fixture drain piping.

H. Install air-admittance-valve wall boxes recessed in wall.

I. Install through-penetration firestop assemblies in plastic [**conductors**] [**and**] [**stacks**] at floor penetrations.

J. Assemble open drain fittings and install with top of hub [**1 inch**] [**2 inches**] <**Insert dimension**> above floor.

K. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
   1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
   2. Size: Same as floor drain inlet.

L. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

M. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

N. Install vent caps on each vent pipe passing through roof.

O. Assemble components of FOG disposal systems and install on floor. Install trap, vent, fresh-air inlet, and flow-control fitting according to authorities having jurisdiction. Install shelf fastened to reinforcement in wall construction and adjacent to unit, unless otherwise indicated. Install culture bottle, culture metering pump, timer, and control on shelf. Install tubing between culture bottle, metering pump, and chamber.

P. Install grease interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.
   1. Above-Floor Installation: Set unit with bottom resting on floor, unless otherwise indicated.
   2. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.
   3. Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.
   4. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

Q. Install grease removal devices on floor. Install trap, vent, and flow-control fitting according to authorities having jurisdiction. Install control panel adjacent to unit, unless otherwise indicated.

R. Set concrete grease interceptors plumb and level. Install manhole access covers flush with finished grade.

S. Install oil interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

T. Install solids interceptors with cleanout immediately downstream from interceptors that do not have integral cleanout on outlet. Install trap on interceptors that do not have integral trap and are connected to sanitary drainage and vent systems.

U. Install drain trough to allow ready access for removal and cleaning of lint screen.

V. Install wood-blocking reinforcement for wall-mounting-type specialties.

W. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. FOG Disposal Systems: Connect inlet and outlet to unit, connect flow-control fitting and fresh-air inlet piping to unit inlet piping, and connect vent piping between trap and media chamber. Connect electrical power.

D. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

E. Grease Removal Devices: Connect controls, electrical power, factory-furnished accessories, and inlet, outlet, and vent piping to unit.

F. Oil Interceptors: Connect inlet, outlet, vent, and gravity drawoff piping to unit; flow-control fitting and vent to unit inlet piping.

G. Ground equipment according to Section 22 05 26 "Grounding and Bonding for Electrical Systems."

H. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.03 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. FOG disposal systems.
2. Grease interceptors.
3. Grease removal devices.
4. Oil interceptors.
5. Solids interceptors.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Comply with requirements for nameplates and signs in Section 22 05 53 “Painting and Identification for Plumbing Piping and Equipment."

3.04 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.05 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 1413

FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Pipe, tube, and fittings.
   2. Specialty pipe fittings.
   3. Encasement for underground metal piping.

1.03 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
   1. Storm Drainage Piping: [**10-foot head of water**]
   2. Storm Drainage, Force-Main Piping: [**50 psig**]

B. Delegated Design: Design seismic restraints for above ground piping including comprehensive engineering analysis by a qualified professional engineer using performance requirements and design criteria according to [**SEI/ASCE 7"Minimum Design Loads for Buildings and Other Structures".**]

1.04 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Comply with requirements Division 01 and Section 22 04 00 "General Requirements for Plumbing".

B. LEED Submittal:
   1. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

C. Shop Drawings: For [**controlled-flow**] roof drainage system. Include calculations, plans, and details.

D. Delegated Design Submittal: For seismic restraints of above ground piping including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.06 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
   1. Notify [**Architect**] days in advance of proposed interruption of storm-drainage service.
   2. Do not proceed with interruption of storm-drainage service without [**Architect's**] permission.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: **AB&I Foundry, Charlotte Pipe and Foundry, Tyler Pipe**. Cast iron pipe and fittings shall be manufactured in the USA bear the Collective Trademark of the Cast Iron Soil Pipe Institute.

B. Pipe and Fittings: ASTM A 74, [**Service**] classes.

C. Gaskets: ASTM C 564, rubber.

D. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.03 SPECIALTY PIPE FITTINGS

A. Transition Couplings:
   1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
   2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
   3. Unshielded, Nonpressure Transition Couplings:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Dallas Specialty & Mfg. Co.
         2) Fernco Inc.
         3) Mission Rubber Company; a division of MCP Industries, Inc.
         4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
      b. Standard: ASTM C 1173.
      c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
      d. Sleeve Materials:
         1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
         2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
         3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
   4. Shielded, Nonpressure Transition Couplings:
      a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Cascade Waterworks Mfg. Co.
         2) Mission Rubber Company; a division of MCP Industries, Inc.
         3) <**Insert manufacturer's name**>.
      b. Standard: ASTM C 1460.
      c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
   5. Pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1) Cascade Waterworks Mfg. Co.
   2) Dresser, Inc.
   3) EBAA Iron, Inc.
   4) Ford Meter Box Company, Inc. (The)
   5) JCM Industries, Inc.
   6) Romac Industries, Inc.
   7) Smith-Blair, Inc.; a Sensus company.
   8) Viking Johnson; c/o Mueller Co.
   9) <**Insert manufacturer's name**>.
b. Standard: AWWA C219.
c. Description: Metal, sleeve-type couplings same size as, with pressure rating at least equal to and ends compatible with, pipes to be joined.
d. Center-Sleeve Material: [**Manufacturer's standard**]
e. Gasket Material: Natural or synthetic rubber.
f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:
1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
   a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) Capitol Manufacturing Company.
      2) Central Plastics Company.
      3) Hart Industries International, Inc.
      4) Jomar International Ltd.
      5) Matco-Norca, Inc.
      6) McDonald, A. Y. Mfg. Co.
      7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
      8) Wilkins; a Zurn company.
   b. Description:
      1) Standard: ASSE 1079.
      2) Pressure Rating: [**150 psig**] at 180 deg F.
      3) End Connections: Solder-joint copper alloy and threaded ferrous.

2.04 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: [**High-density, crosslaminated PE film of 0.004-inch** minimum thickness.

C. Form: [**Sheet**] [**or**] [**tube**].

D. Color: [**Black**] [**or**] [**natural**].

PART 3 - EXECUTION

3.01 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in **[Section 22 04 00 "General Requirements for Plumbing"**] [**Section 31 20 00 "Earth Moving"**].

3.02 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Where trenches are excavated such that the bottom of the trench forms the bed for the pipe, solid and continuous load bearing support shall be provided between joints. Bell holes, hub holes and coupling holes shall be provided at points where the pipe is joined. Such pipe shall not be supported on blocks to grade.

N. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
   1. Building Storm Drain: 2 percent downward in direction of flow for piping NPS 2 and smaller; 1 percent downward in direction of flow for piping NPS 3and larger.

O. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
   1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

P. Install steel piping according to applicable plumbing code.

Q. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

R. Install aboveground PVC piping according to ASTM D 2665.

S. Install underground PVC piping according to ASTM D 2321.

T. Install engineered [**controlled-flow**] [**siphonic**] drain specialties and storm drainage piping in locations indicated.

U. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping

outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

V. Install force mains at elevations indicated.

W. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves in Section 22 14 23 "Storm Drainage Piping Specialties."
2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts in Section 22 14 23 "Storm Drainage Piping Specialties."
3. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains in Section 22 14 23 "Storm Drainage Piping Specialties."

X. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Y. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves in Section 22 04 00 “General Requirements for Plumbing”.

Z. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons in Section 22 04 00 "General Requirements for Plumbing Piping".

3.03 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hubless, Cast-Iron Soil Piping Coupled Joints: Joints for hubless cast iron soil pipes and fittings shall conform to CISPI 310, latest revision and be certified by NSF for compliance to CISPI 310.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

E. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.04 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: [**Unshielded**] nonpressure transition couplings.
3. In Aboveground Force-Main Piping: Fitting-type transition couplings.
4. In Underground Force-Main Piping:
   a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
   b. NPS 2 and Larger: Pressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

2. Dielectric Fittings for **NPS 2** and Smaller: Use dielectric.
3. Dielectric Fittings for **NPS 2-1/2 to NPS 4**: Use dielectric flanges**.**
4. Dielectric Fittings for **NPS 5** and Larger: Use dielectric flange kits.

3.05 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves: Install shutoff valve on each sump pump discharge.
   1. Install gate or full-port ball valve for piping NPS 2 and smaller.
   2. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing-check valve, between pump and shutoff valve, on each sump pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.
   1. Horizontal Piping: Horizontal backwater valves.[**Use normally closed type unless otherwise indicated.**]
   2. Install backwater valves in accessible locations.
   3. Comply with requirements for backwater valves in Division 22 Section "Storm Drainage Piping Specialties."

3.06 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 22 05 48 “Vibration and Seismic Controls for Plumbing Piping and Equipment”.

B. Comply with requirements for pipe hanger and support devices and installation in Section 22 05 53 "Hangers and Supports for Plumbing Piping and Equipment."
   1. Install [**carbon-steel**] <**Insert material**> pipe hangers for horizontal piping in noncorrosive environments.
   2. Install [**stainless-steel**] [**fiberglass**] pipe hangers for horizontal piping in corrosive environments.
   3. Install [**carbon-steel**] pipe support clamps for vertical piping in noncorrosive environments.
   4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
   5. Vertical Piping: MSS Type 8 or Type 42, clamps.
   6. Individual, Straight, Horizontal Piping Runs:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
      c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
   7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting [**valve,**] and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 2: 60 inches with 3/8-inch rod.
   2. NPS 3: 60 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
   4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
   5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
   6. Spacing for 10-foot pipe lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/4: 84 inches with 3/8-inch rod.
   2. NPS 1-1/2: 108 inches with 3/8-inch rod.
   3. NPS 2: 10 feet with 3/8-inch rod.
   4. NPS 2-1/2: 11 feet with 1/2-inch rod.
   5. NPS 3: 12 feet with 1/2-inch rod.
   6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
   7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
   8. NPS 10 and NPS 12: 12 feet with 7/8-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/4: 72 inches with 3/8-inch rod.
   2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   3. NPS 2-1/2: 108 inches with 1/2-inch rod.
   4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
   5. NPS 6: 10 feet with 5/8-inch rod.
   6. NPS 8: 10 feet with 3/4-inch rod.

K. Install supports for vertical copper tubing every 10 feet.

L. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 2: 48 inches with 3/8-inch rod.
   2. NPS 3: 48 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
   4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
   5. NPS 10 and NPS: 48 inches with 7/8-inch rod.

M. Install supports for vertical PVC piping every 48 inches.

N. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.07 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.
   1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
   2. Install horizontal backwater valves [**with cleanout cover flush with floor**]
   3. Comply with requirements for [**cleanouts**] [**and**] [**drains**] in Section 22 14 23 "Storm Drainage Piping Specialties."

D. Connect force-main piping to the following:
   1. Storm Sewer: To exterior force main.
   2. Sump Pumps: To sump pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:
   1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.08 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification in Section 22 07 00 "Identification for Plumbing Piping and Equipment."

3.09 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to plumbing code:
   1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
   2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   3. Storm Drainage System Water Test: A water test shall be applied to the storm drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test, and each section shall be filled with water, but no section shall be tested with less than a 10-foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested so that no joint or pipe in the building except the uppermost 10 feet of the system shall have been submitted to a test of less than a 10 foot head of water. This pressure shall be held for at least 15 minutes. The system shall then be tight at all points.
   4. Storm Drainage System Air Test: An air test shall be made by forcing air into the system until there is a uniform gauge pressure of 5 psi or sufficient to balance a 10-inch column of mercury. This pressure shall be held for a test period of at least 15 minutes. Any adjustments to the test pressure required because of changes in ambient temperature or the seating of gaskets shall be made prior to the beginning of the test periods. **Plastic piping shall not be tested with air unless manufacturer literature states air testing is acceptable**.
   5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
   6. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
   1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.10 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping shall be the following:
   1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.

C. Underground storm drainage piping shall be the following:
   1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.

D. Aboveground storm drainage force mains shall be the following:
   1. Galvanized-steel pipe, pressure fittings, and threaded joints.

E. Underground storm drainage force mains shall be the following:
   1. Ductile-iron, mechanical-joint piping and mechanical joints.

END OF SECTION

SECTION 22 14 23

REINFORCED CONCRETE STORM SEWERS AND APPURTENANCES

PART 1 - GENERAL

1.01 SCOPE

A. The work includes the construction of reinforced concrete pipe storm sewers and other miscellaneous drainage structures and appurtenances.

1.02 SUBMITTALS

A. Submit to the Architect/Engineer in conformance with the requirements of the CONDITIONS OF THE CONTRACT.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 33 -Trenching and Backfilling

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforced Concrete Pipe: Reinforced concrete pipe shall conform to the current specifications for reinforced concrete pipe, ASTM Designation C76 of the class shown on the plans. If not otherwise shown on the plans, all reinforced concrete pipes shall be Class III. All pipe shall be machine made by a process that will provide for uniform placement of zero slump concrete in the form and compaction by mechanical devices which will assure a dense concrete in the finished product.

B. Concrete for Inlets and Appurtenances: Reinforced concrete for inlets shall have a minimum compressive strength at twenty-eight (28) days of 4,000 pounds per square inch and a minimum cement content of five (5) sacks of cement per cubic yard of concrete.

C. Mortar: Mortar for pipe joints and connections to other drainage structures shall be composed of one (1) part by volume of Portland cement and two (2) parts of sand.

PART 3 - EXECUTION

3.01 BEDDING

A. All pipe shall receive embedment per the detail on the plans.

3.02 EXCAVATION

A. Excavation for storm sewer pipes shall consist of performing all excavation of every description and of whatever substance is encountered to the depth required. All excavated material which is not required for backfill or fill shall be removed and disposed of by the Contractor. All excavation shall be made by open cut; banks of trenches shall be kept as nearly vertical as possible and, if required, shall be properly sheeted and braced. For pipes having an inside diameter of thirty-three (33") inches or less, the trench

shall be excavated a minimum of sixteen (16") inches wider than the outside diameter of the pipe. The trench shall be excavated a minimum of sixteen (16") inches wider than the outside diameter of the pipe so that a clear space of not less than eight (8") inches is provided on each side of the pipe.

B. Cold Applied, Preformed Plastic Gaskets. These preformed gaskets may be used for sealing tongue and groove concrete pipe sewers. The gasket shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes, or obnoxious odors. The gasket joint sealer shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength and shall be supplied in extruded rope form of suitable cross section. The gasket joint sealer shall be protected by a removable two-piece wrapper designed so that one-half may be removed longitudinally without disturbing the other half to facilitate application. Preformed gaskets shall be Ram-Nek, as manufactured by K T. Snyder Co., Inc. of Houston, Texas, or approved equal.

3.05 BACKFILL

A. After the bedding has been prepared and the pipes installed as required, backfill shall be placed in accordance with Section 32 13 13. If the material, when tested, fails to meet the density requirements, the backfill shall be required to be removed and replaced to meet the proper density.

B. Backfill shall not be placed until the Architect/Engineer or his representative has observed the trench and authorized the placing of backfill. All debris shall be removed from the trench prior to beginning the backfilling operations. Sheet, shoring and bracing shall be pulled and removed during the progress of the backfilling in such a manner to protect the trench and the pipe.

C. Backfilling shall then be brought up to an elevation slightly above the original ground level to allow for subsequent settlement. The top surface of slopes of all backfill shall be neatly graded off in a workmanlike manner, and where select topsoil, sod, or other material is removed and piled separately, such material shall be carefully replaced in a manner satisfactory to the Architect/Engineer. The top one (1') foot of backfill material shall be of as good quality as the original topsoil which was removed.

3.06 DRAINAGE STRUCTURES

A. Inlets: Inlets shall be constructed as shown on the drawings. Excavation shall be made with appropriate equipment with a minimum of interference with adjacent improvements and existing utilities. After installation of inlets, all excavated areas which are not occupied by the inlet shall be backfilled with selected materials from the excavation. The backfill material shall be compacted to not less than ninety-five (95%) percent to one hundred (100%) percent of standard density, in accordance with AASHTO T-99.

END OF SECTION

SECTION 22 1423

STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Roof drains.
   2. Miscellaneous storm drainage piping specialties.
   3. Cleanouts.
   4. Trench drains.
   5. Channel drainage systems.
   6. Through-penetration firestop assemblies.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated [S]. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

1.04 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.01 METAL ROOF DRAINS

A. Refer to plumbing drawings for type of storm roof drains

2.02 CLEANOUTS [S]

A. Floor Cleanouts
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but not limited, to the following:
      a. Interior Finished Areas: **Josam 57000-22, Jay R. Smith, 4033L, Zurn ZN-1400**, nickel bronze top.
      b. Interior Finished Areas: **Josam 58460-A, Jay R. Smith 4333C, Zurn ZN-1454**, nickel bronze top, flashing flange.
      c. Interior Equipment Rooms and Concrete Floors of Unfinished Areas on Grade: **Josam 57000-X-CI-22, Jay R. Smith 4231, Zurn Z-1400 HD** cast iron frame and cover.
      d. Interior Equipment Rooms and Unfinished Spaces Above Slab on Grade: **Josam 58460A, Jay R. Smith 4333, Zurn Z-1455,** cast iron frame and cover, flashing flange.
      e. Interior Equipment Rooms with Isolation Slabs Above Structural Slab. **Josam series 29000 drain body with pipe extension and 57000 X-C1-22 cleanout, Jay R. Smith No. 9350, Zurn No. Z626,** cast iron construction elastomeric gaskets.
      f. **Josam series 2900 drain body with pipe extension and 57000-X-C1-22 cleanout, Jay R. Smith No. 9350, Zurn Z-626,** Cast iron Construction elastomeric gaskets.
   2. Standard: ASME A112.36.2M. **Cleanouts shall be manufactured in the USA.**
   3. Size: Same as connected branch or as indicated on the Drawing.
   4. Type: **[Cast-iron soil pipe with cast-iron ferrule]**

5. Body or Ferrule Material: Cast iron.
6. Clamping Device: **[Not required]**
7. Outlet Connection: **[Threaded]**
8. Closure: Brass plug with tapered threads.
9. Adjustable Housing Material**: [Cast iron]** with threads [**screws or other device].**
10. Frame and Cover Material and Finish: Nickel-bronze, copper alloy, Painted cast iron or Polished bronze.
11. Frame and Cover Shape: Round.
12. Top-Loading Classification**: [Heavy Duty]**
13. **R**iser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

B. Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Painted Drywall and Finished Masonry Walls: **Josam 58600-PLG, Jay R. Smith 4472, Zurn Z-1468**.
   b. Plastered Walls: **Josam 58640, Jay R. Smith 4930-Smooth, Zurn ZN-1447**, nickel bronze frame and cover.
2. Standard: ASME A112.36.2M, for cleanouts. Include wall access. **Cleanouts shall be manufactured in the USA.**
3. Size: Same as connected drainage piping.
4. Body Material: [**Hub-and-spigot, cast-iron soil-pipe T-branch**] required to match connected piping.
5. Closure: Countersunk, drilled-and-threaded, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

C. Outside Cleanouts:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but not limited to, the following: **Josam 55000-Z-22, Jay R. Smith 4233, Wade 6000-NH-X, Zurn Z-1400 NH.**
2. Standard: ASME A112.36.2M**. Cleanouts shall be manufactured in the USA.**
3. Size: Same as branch or as indicated on Drawings
4. Type: Adjustable Housing
5. Body Material: Cast Iron
6. Closure Plug: Brass with taper thread
7. Frame and Cover: Round Cast Iron
8. Top Loading Classification: Heavy Duty
9. Outlet: No-Hub or spigot

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install primary roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Roofing materials are specified in Division 07 Sections.

1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
2. Install expansion joints, if indicated, in roof drain outlets.
3. Position roof drains for easy access and maintenance.

B. Install secondary roof drains at normal roof elevation to prevent ponding around drains.

C. Install downspout adapters on outlet of back-outlet parapet roof drains and connect to sheet metal downspouts.

D. nstall discharge [elevation indicated on the drawings] [conductor nozzles at exposed bottom of conductors where they spill onto grade].

E. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
   1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
   2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
   3. Locate cleanouts at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
   4. Locate cleanouts at base of each vertical soil and waste stack.

F. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

G. Set outside cleanouts flush with finished grade and provide 18” square by 6” deep concrete apron around cleanout.

H. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

I. Install horizontal backwater valves in floor with cover flush with floor.

J. Install drain-outlet backwater valves in outlet of drains.

K. Install test tees in vertical conductors and near floor.

L. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

M. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface unless otherwise indicated.

N. Assemble channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

O. Install through-penetration firestop assemblies in plastic conductors at concrete floor penetrations.

P. Install sleeve flashing device with each conductor passing through floors with waterproof membrane.

Q. Install yard drains with 8”W X 6”D concrete apron around Drain. Comply with requirements detailed on the Drawings and specified in Section 03 33 00 “Cast In Place Concrete”.

3.02 CONNECTIONS

A. Comply with requirements for piping in Section 22 14 13 “Facility Storm Drainage Piping”. Drawings indicate general arrangement of piping, fittings, and specialties.

3.03 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 3300

ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Commercial, electric, storage, domestic-water heaters.
   2. Domestic-water heater accessories.

1.03 SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated [S]. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories**.** Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing.

B. LEED Submittal:
   1. Product Data for Prerequisite EA 2: Documentation indicating that units comply with ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."

C. Shop Drawings:
   1. Wiring Diagrams: For power, signal, and control wiring.

D. Seismic Qualification Certificates: For commercial domestic-water heaters, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Product Certificates: For each type of [**commercial**] electric, domestic-water heater, from manufacturer.

F. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

G. Source quality-control reports.

H. Field quality-control reports.

I. Operation and Maintenance Data: For electric, domestic-water heaters indicated [O/M], to include in emergency, operation, and maintenance manuals. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

J. Warranty: Sample of special warranty.

1.04 QUALITY ASSURANCE

A. 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.

B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects" and NSF 372, "Drinking Water System Components- Lead Content".

1.05 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including storage tank and supports.
      b. Faulty operation of controls.
      c. Deterioration of metals, metal finishes, and other materials beyond normal use.
   2. Warranty Periods: From date of Substantial Completion.
      a. Commercial, Large Volume Electric Storage, Domestic-Water Heaters:
         1) Storage Tank: Five year non pro-rated with additional five year pro-rated.
         2) Controls and Other Components: [**Three**] years.
      b. Commercial, Electric, Storage, Domestic-Water Heaters:
         1) Storage Tank: Three years.
         2) Controls and Other Components: One year.
      c. Commercial, Light-Duty, Storage, Electric, Domestic-Water Heaters:
         1) Storage Tank: Three years.
         2) Controls and Other Components: One year.
      d. Residential, Electric, Storage, Domestic-Water Heaters:
         1) Storage Tank: [**Six**] years.
         2) Controls and Other Components: [**Six**] years.
      e. Electric, Tankless, Domestic-Water Heaters:] [**Five**] year(s).
      f. Thermal Expansion Tanks: [**Five**] years.

PART 2 - PRODUCTS

2.01 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS [S] [O/M]

A. Commercial, Large Volume Electric, Storage, Domestic-Water Heaters EWH-1
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following: **Cemline, EHB Series,**
   2. Standard: UL 1453.
   3. Storage-Tank Construction: ASME-code, steel [**vertical**] arrangement.
      a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.
         1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
         2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
      b. Pressure Rating: 150 psi.
      c. Interior Finish: “Stonesteel” Hydraulic cement applied over wire mesh.
   4. Factory-Installed Storage-Tank Appurtenances:
      a. Thermometer.
      b. Pressure Gage

c. 11” x 15” Manhole
d. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
e. Insulation: Comply with ASHRAE/IESNA 90.1.
f. Jacket: Steel with enameled finish.
g. Heating Elements: Electric, individually mounted bolt-on immersion type.
h. Temperature Control: Adjustable thermostat.
i. Base: Structural I-Beam [**Horizontal heaters only]**
j. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
k. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

5. Special Requirements: NSF 5 construction.
6. Capacity and Characteristics;
   a. Capacity: **80 gal**
   b. Recovery: **<24 gph> at [100 deg. F] >** temperature rise.
   c. Temperature Setting: **[140 deg F]**
   d. Power Demand: **<insert kilowatts>**
   e. Heating Elements: **<insert number>**
   f. Kilowatts Each Element: **<insert killowatts>**
   g. Number of stages: **<insert number>**
   h. Volts: **[208]**
   i. Phases: **[three]**
   j. Hertz: 60

2.02 DOMESTIC-WATER HEATER ACCESSORIES [S]

A. Thermal Expansion Tanks:
   1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. AMTROL Inc.
      b. Flexcon Industries.
      c. Honeywell International Inc.
      d. Pentair Pump Group (The); Myers.
      e. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
      f. State Industries.
      g. Taco, Inc.
   2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
   3. Construction:
      a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
      b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
      c. Air-Charging Valve: Factory installed.
   4. ASME Thermal Expansion Tank No. **TET-1**
      a. Working-Pressure Rating: [**150 psig**]
      b. Capacity Acceptable: [**2 gal.**] minimum.
      c. Air Precharge Pressure: 40 psig.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1[**or ASHRAE 90.2**].

D. Heat-Trap Fittings: ASHRAE 90.2.

E. Manifold Kits: Domestic-water heater manufacturer's factory-fabricated inlet and outlet piping for field installation, for multiple domestic-water heater installation. Include ball, butterfly, or gate type shutoff valves to isolate each domestic-water heater and [**calibrated**] balancing valves to provide balanced flow through each domestic-water heater.

1. Comply with requirements for ball or gate type shutoff valves, check valves and balancing valves in Section 22 05 23"General-Duty Valves for Plumbing Piping."

F. Pressure-Reducing Valves: ASSE 1003 for water. Set at 25-psig-maximum outlet pressure, unless otherwise indicated.

G. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

H. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

I. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

J. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

K. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.

L. Domestic-Water Heater Supports: Factory-fabricated steel wall mounted unit with welded gussets and brackets, front rings for threaded rod support capable of supporting domestic-water heater and water.

2.03 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test [**commercial**] domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 03 30 00 "Cast-in-Place Concrete"

1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Residential, Electric, Domestic Water Heater Mounting: Install residential, electric, domestic-water heaters **concrete base**. Comply with requirements for concrete bases specified in, Section 03 30 00 “Cast-in-Place Concrete”.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

C. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves in Section 22 05 23"General-Duty Valves for Plumbing Piping."

D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves in Section 22 11 19 "Domestic Water Piping Specialties."

F. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers in Section 22 11 19"Domestic Water Piping Specialties."

G. Assemble and install inlet and outlet piping manifold kits for multiple electric, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each electric, domestic-water heater outlet. Comply with requirements for valves and thermometers in Section 22 05 23"General-Duty Valves for Plumbing Piping."

H. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

I. Fill electric, domestic-water heaters with water.

J. Charge domestic-water compression tanks with air.

3.02 CONNECTIONS

A. Comply with requirements for piping in Section 22 11 16"Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Provide proper support for thermal expansion tanks and piping. Arrange expansion tanks piping for easy removal of domestic-water heaters.

3.03 IDENTIFICATION

A. Identify system components. Comply with requirements for identification in Section 22 05 53 "Painting and Identification for Plumbing Piping and Equipment."

3.04 FIELD QUALITY CONTROL

A. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
   2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.05 DEMONSTRATION

A. [**Train**] Owner's maintenance personnel to adjust, operate, and maintain [**commercial**] electric, domestic-water heaters.

END OF SECTION

SECTION 22 4000

PLUMBING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Water closets.
2. Lavatories.
3. Sinks.
4. Showers.

1.04 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated [S]. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For plumbing fixtures indicated [O/M] to include in emergency, operation, and maintenance manuals. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

D. Warranty: Special warranty specified in this Section.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.

D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.

E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

F. FRP: Fiberglass-reinforced plastic.

G. PMMA: Polymethyl methacrylate (acrylic) plastic.

H. PVC: Polyvinyl chloride plastic.

I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"[**; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act";**] for plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Compliance for fixture materials that will be in contact with potable water: NSF 61, "Drinking Water System Components - Health Effects" and NFS 372, "Drinking Water System Components - Lead Content".

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
2. Plastic Bathtubs: ANSI Z124.1.
3. Plastic Lavatories: ANSI Z124.3.
4. Plastic Laundry Trays: ANSI Z124.6.
5. Plastic Mop-Service Basins: ANSI Z124.6.
6. Plastic Shower Enclosures: ANSI Z124.2.
7. Slip-Resistant Bathing Surfaces: ASTM F 462.
8. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
9. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.
10. Stainless-Steel Residential Sinks: ASME A112.19.3.
11. Vitreous-China Fixtures: ASME A112.19.2M.
12. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
13. Water-Closet, Flushometer Tank Trim: ASSE 1037.

H. Comply with the following applicable standards and other requirements specified for [**lavatory**] [**and**] [**sink**] faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
4. Faucets: ASME A112.18.1.
5. Hose-Connection Vacuum Breakers: ASSE 1011.
6. Hose-Coupling Threads: ASME B1.20.7.
7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
8. NSF Potable-Water Materials: NSF 61.
9. Pipe Threads: ASME B1.20.1.
10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
11. Supply Fittings: ASME A112.18.1.
12. Brass Waste Fittings: ASME A112.18.2.

I. Comply with the following applicable standards and other requirements specified for [**shower**] faucets:

1. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
2. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
3. Deck-Mounted Bath/Shower Transfer Valves: ASME 18.7.
4. Faucets: ASME A112.18.1.
5. Hand-Held Showers: ASSE 1014.
6. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
7. Hose-Coupling Threads: ASME B1.20.7.
8. Manual-Control Antiscald Faucets: ASTM F 444.
9. Pipe Threads: ASME B1.20.1.
10. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
11. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
12. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.

J. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1.
3. Dishwasher Air-Gap Fittings: ASSE 1021.
4. Manual-Operation Flushometers: ASSE 1037.
5. Plastic Tubular Fittings: ASTM F 409.
6. Brass Waste Fittings: ASME A112.18.2.
7. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

K. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Disposers: ASSE 1008 and UL 430.
2. Dishwasher Air-Gap Fittings: ASSE 1021.
3. Flexible Water Connectors: ASME A112.18.6.
4. Floor Drains: ASME A112.6.3.
5. Grab Bars: ASTM F 446.
6. Hose-Coupling Threads: ASME B1.20.7.
7. Off-Floor Fixture Supports: ASME A112.6.1M.
8. Pipe Threads: ASME B1.20.1.
9. Plastic Shower Receptors: ANSI Z124.2.
10. Plastic Toilet Seats: ANSI Z124.5.
11. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.06 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures of unit shell.
   b. Faulty operation of controls, blowers, pumps, heaters, and timers.
   c. Deterioration of metals, metal finishes, and other materials beyond normal use.
2. Warranty Period for Commercial Applications: [**Three**] year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 WATER CLOSETS [S]

FLUSH VALVE TYPE

A. WC-**1**Water Closets:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **American Standard, Crane Kohler Sloan , Zurn .**
2. Description **Wall**-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
    a. Style: Flushometer valve.
        1) Bowl Type: Elongated with [**siphon-jet**] design.
        2) Design Consumption: **[1.28 gal./flush]** >.
        3) Color: **White**.
3. Flushometer: **Sloan , Delany , Zurn >.** Include brass body with corrosion-resistant internal components, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
    a. Internal Design: [**Diaphragm**] operation.
    b. Style: [**Exposed**]].
    c. Inlet Size: NPS 1.
    d. Trip Mechanism: [**lever-handle actuator**]
    e. Consumption: [**1.28 gal./flush**]
    f. Tailpiece Size: [**NPS 1-1/4]** length to top of bowl.
    g. Handicap accessible handle assembly mounted on the side of the compartment with the most clear floor space.
4. Toilet Seat: **Church , Beneke , Olsonite ,** for water-closet-type fixture.
    a. Material: Molded, solid plastic[**with antimicrobial agent**].
    b. Configuration: [**Closed**] cover.
    c. Size: Elongated.
    d. Hinge Type: [**CK, check**]
    e. Class: [**Standard commercial**]
    f. Color: **White**
5. Mounting Height: **[15”]**floor to rim.

2.02 LAVATORIES [S]

A. L- **1** Lavatories:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **American Standard, Crane , Kohler , [Other] <insert model>.**
2. Description: [**Accessible, wall**] fixture.
    a. Type: [**With back**]
    b. Size: [**20 by 18 inches**] rectangular.
    c. Faucet Hole Punching: [**Three holes, 2-inch centers**]
    d. Faucet Hole Location: [**Top**]
    e. Pedestal: [**Not required**]
3. Faucet: **Chicago T&, Zurn,** [**Two-handle mixing**] valve. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
    a. Finish: [**Polished chrome plate**]
    b. Maximum Flow Rate: **0.5 gpm**
    c. Centers: [**4 inches**] [**8 inches**] [**Adjustable**].
    d. Mounting: [**Deck, concealed**]
    e. Valve Handle(s): [**Knob**]].
    f. Inlet(s): [**NPS 1/2 male shank**] [**NPS 1/2] female shank**].
    g. Spout: [**Rigid, gooseneck**] type.
    h. Spout Outlet: [**Aerator**]
    i. Operation: [**Compression, manual**]].
    j. Drain: [**Pop up**]
    k. Water Tempering Valve: Tempering Valve is specified in Section 22 11 19 “Domestic Water Piping Specialties”,

B. Lavatory Fittings:

1. Description: Chrome finish brass lavatory supply assembly [**copper sweat**] ½ x OD 3/8, brass "Quarter Turn" ball valve angle stops with convertible – [**conventional**] handle, chrome finish copper flexible risers, chrome finish steel escutcheons; [**NPS 1-¼**] chrome finish cast brass ground joint swivel "P"-Trap with cleanout plug, cast brass slip nuts, 17 gage chrome finish tubular extension to wall, chrome finish steel box or bell wall flange.
2. Description: Chrome finish brass lavatory supply assembly [**copper sweat**]] ½ x OD 3/8, brass "Quarter Turn" ball valve straight stops, [**wheel handle**] chrome finish copper flexible risers, chrome finish steel escutcheons; **NPS 1-½**] chrome finish cast brass ground joint swivel "P" Trap with cleanout plug, cast brass slip nuts, 17 gage chrome finish tubular extension to wall, chrome finish steel box or bell wall flanges.

C. Protective Shielding Piping Enclosures:

1. For each L-1 > lavatory, the drain and water supplies shall be insulated with protective shielding enclosures from bottom of lavatory to wall.
2. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **Truebro "Lav Guard" 102 W with accessory 105 as required, Plumberex "Pro-Extreme" X4333 with accessory X4114 as required, McGuire "Prowrap" 2125WC or 2125 PW WC as required.**
3. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with [**ICC/ANSI A117.1**] [**ADA**] requirements.

D. Lavatory Supports for Stud and Drywall Partitions:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: [CONCEALED ARM SUPPORT] **Josam Series 17100, Jay R. Smith Series 0700, Jay R. Smith Series 0800, Zurn Series Z-1231**] [WALL HANGER PLATE] **Josam Series 17550, Jay R. Smith Series 0800, Zurn Series Z-1224.**
2. Description: Type [**I, lavatory carrier with concealed arms and tie rod**] [**II lavatory carrier with hanger plate and tie rod**] for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
3. Accessible-Fixture Support: Include rectangular steel uprights.

E. Lavatory Supports for Masonry Walls:

1. Description: Rectangular steel plates 20"L x 4" H x 1/8"D located on back side of partition where lavatories are mounted against pipe spaces to hold supporting bolts for wall hangers. Locate plate in wall construction where no pipe space exists behind fixture.
2. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following [CONCEALED ARM SUPPORT] **Josam Series 17120-BP, Jay R. Smith Series 0728, Zurn Series Z-1254** [WALL HANGER SUPPORT] **Josam Series 17590, Jay R. Smith Series 0826, Zurn Series Z-1259**.
3. Description: Rectangular steel plates complete with bolts, nuts, washers, located on back side of partition for wall mounting, lavatory type fixture. Locate plate in wall construction where no pipe space exists.

2.03 SINKS [S]

A. S-**1**Sinks:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **Elkay <insert model>, Just <insert model>, [Other] <insert model>**
2. Description: One bowl, classroom, counter-mounting, stainless-steel kitchen sink.
   a. Overall Dimensions: [**25"x17"**] [**8"**] depth.
   b. Metal Thickness: [**20 gage**] [

c. Drain: 3-1/2-inch [**chrome plated brass**].
1) Location: [**Centered in bowl**] >.
d. Punching: [**One**]
e. Supplies: NPS 1/2 chrome-plated copper **[loose key]** with stops.
f. Drain Piping: NPS 1-1/2 chrome-plated, cast-brass P-trap; 17 gage- thick tubular brass waste to wall; [**continuous waste;]** and wall escutcheon(s).

3. Faucet: **Chicago T&S Zurn**] Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
a. Body Material: Commercial, solid brass
b. Finish: **Polished chrome plate**.
c. Maximum Flow Rate: [**2.2 gpm**] unless otherwise indicated.
d. Mixing Valve: Two-lever handle.
e. Centers: [**4 inches**] [**8 inches**] [**Single hole**] [**Adjustable**].
f. Mounting: Deck]
g. Handle(s): [**Lever**]
h. Inlet(s): [**NPS 1/2 male shank**]
i. Spout Type: [**Rigid gooseneck**]
j. Spout Outlet: **Aerator**.
k. Vacuum Breaker: Not required.
l. Operation: [**Compression, manual**]
4. Bubbler: **Elkay LK1141A, Just JSB-10-VR-FLX,** chrome plated, lead free construction, flexible guard, self closing bush button actuator.

B. Disposers:
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **In-Sink-Erator Kitchen Aid Maytag**
2. Description: [**Batch**] [**Continuous**]-feed household, food-waste disposer. Include reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; NPS 1-1/2 outlet; quick-mounting, stainless-steel sink flange; antisplash guard; and combination cover/stopper.
a. Type: [**Batch**] [**Continuous**]-feed household.
b. Model: [**Not applicable**] [**Sound-insulated chamber**] [**Sound-insulated chamber and stainless-steel outer shell**].
c. Motor: 115-V ac, 1725 rpm, [**1/2**] hp with overload protection.

C. Dishwasher Air-Gap Fittings,
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Brass Craft Mfg. Co.; a Subsidiary of Masco Corporation.
b. Dearborn Brass; a div. of Moen, Inc.
c. Geberit Manufacturing, Inc.
d. Sioux Chief Manufacturing Company, Inc.
e. Watts Brass & Tubular; a division of Watts Regulator Co.
2. Description: Fitting suitable for use with domestic dishwashers and for deck mounting; with plastic body [**chrome-plated**]; and capacity of at least 5 gpm; and inlet pressure of at least 5 psig at a temperature of at least 140 deg F. Include 5/8-inch- ID inlet and 7/8-inch- ID outlet hose connections.
3. Hoses: Rubber and suitable for temperature of at least 140 deg F.
a. Inlet Hose: 5/8-inch ID and [**48 inches**] long.
b. Outlet Hose: 7/8-inch ID and [**48 inches**] long.

D. Protective Shielding Piping Enclosures,
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Truebro "Lav Guard" 102 W with accessory 105 as required, Plumberex "Pro-Extreeme"X4333 with accessory X4114 required, McGuire "Prowrap" PW2150 with accessory PW"155" W/C as required.

2. Description: White manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with [**ADA**] [**ICC/ANSI A117.1**] requirements.

2.04 SHOWERS [S]

A. SH-**<insert number>** Showers,:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, Freedom Showers
2. Description: [**Accessible,**] Refer to plumbing schedules.
   a. Size: [**Refer to schedules on plumbing drawings**
   b. Color: **White**.
   c. Drain Location: [**Center**]].
   d. Accessibility Options: Include grab bar and HPDE fold down Seat.
   e. Drain: Grid, NPS 2.
   f. Finish: [**Polished chrome plate**] >.
   g. Maximum Flow Rate: [**2.5 gpm**] unless otherwise indicated.
   h. Mounting: Concealed.
   i. Backflow Protection Device for Hand-Held Shower: Required.
   j. Handle: Metal Lever.
   k. Antiscald Device: [**Integral with mixing valve**]
   l. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.
   m. Supply Connections: [**NPS 1/2**]
   n. Shower Head Type: Hand held, slide-bar mounted.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-mounting fixtures with tubular waste piping attached to supports.

F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

G. Install counter-mounting fixtures in and attached to casework.

H. Install fixtures level and plumb according to roughing-in drawings.

I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Comply with requirements for valves specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

K. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

L. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

M. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

N. Install toilet seats on water closets.

O. Install trap-seal liquid in dry urinals.

P. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

Q. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

R. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

S. Install shower flow-control fittings with specified maximum flow rates in shower arms.

T. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

U. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

V. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Install [**in sink deck**] [**on countertop at sink**] <**Insert location**>. Connect inlet hose to dishwasher and outlet hose to disposer.

W. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with requirements for escutcheons specified in Section 22 04 00 “General Requirements for Plumbing”.

X. Set [**bathtubs**] [**shower receptors**] [**and**] [**service basins**] in leveling bed of cement grout.

Y. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.04 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.05 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust [**disposers**] [**and**] [**controls**]. Replace damaged and malfunctioning units [**and controls**].

C. Adjust water pressure at [**faucets**] [**and**] [**flushometer valves**] to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Install fresh batteries in sensor-operated mechanisms.

3.06 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.07 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 4700

WATER COOLERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:

1. Electric water coolers.

1.03 DEFINITIONS

A. Accessible [**Water Cooler**]: Fixture that can be approached and used by people with disabilities.

B. Water Cooler: Electrically powered fixture for generating and delivering cooled drinking water.

1.04 SUBMITTALS

A. Product Data: For each fixture indicated [S]. Include rated capacities, furnished specialties, and accessories. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

B. Operation and Maintenance Data: For fixtures indicated [O/M] to include in emergency, operation, and maintenance manuals. Comply with requirements in Division 01 and Section 22 04 00 “General Requirements for Plumbing”.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"[**; , "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act";**] for fixtures for people with disabilities.

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

D. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.

E. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant, unless otherwise indicated.

PART 2 - PRODUCTS

A.

2.02 ELECTRIC WATER COOLERS [S]

A. EWC-**1** Electric Water Coolers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: **Elkay Haws Oasis**
2. Description: ARI 1010, Type PB, pressure with bubbler, [**Style F, freestanding**] water cooler.
   a. Cabinet: [**All stainless steel**]
   b. Bubbler: One, with adjustable stream regulator, located on deck.
   c. Control: [**Push button**]
   d. Supply: NPS 3/8 with ball, gate, or globe valve.
   e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
   f. Drain: Grid with NPS 1-1/4 minimum horizontal waste and trap complying with ASME A112.18.2.
   g. Cooling System: Electric, with [**precooler,**] hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
      1) Capacity: [**5 gph**] of 50 deg F cooled water from 80 deg F inlet water and 90 deg F ambient air temperature.
      2) Electrical Characteristics: [**1/6**] hp; 120-V ac; single phase; 60 Hz.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.

B. Examine walls and floors for suitable conditions where fixtures are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

A. Use carrier off-floor supports for wall-mounting fixtures, unless otherwise indicated.

B. Use mounting frames for recessed water coolers, unless otherwise indicated.

C. Set freestanding and pedestal drinking fountains on floor.

D. Set remote water coolers on floor, unless otherwise indicated.

E. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

3.03 INSTALLATION

A. Install off-floor supports affixed to building substrate and attach wall-mounting fixtures, unless otherwise indicated.

B. Install mounting frames affixed to building construction and attach recessed water coolers to mounting frames, unless otherwise indicated.

C. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.

D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Comply with requirements for valves are specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

F. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings. Comply with requirements for escutcheons are specified in Section 22 04 00 “General Requirements for Plumbing”.

G. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.04 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.05 FIELD QUALITY CONTROL

A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.

1. Remove and replace malfunctioning units and retest as specified above.

3.06 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

B. Adjust water cooler temperature settings.

3.07 CLEANING

A. After completing fixture installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

END OF SECTION

SECTION 23 0010

HVAC GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Work Included:

Every item of labor, materials, equipment and appurtenances for installing complete new Heating, Ventilating and Air Conditioning Systems included in Division 23 of the Specifications.

1.02 DRAWINGS

A. The mechanical Drawings are diagrammatic in nature and show the general arrangement of all ductwork, piping, equipment and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the mechanical Drawings, it is not feasible to indicate all offsets, fittings and accessories that may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.

B. Where discrepancies in scope of work as to which Trade provides specific items, such as starters, disconnects, flow switches, electrical control components, etc. exist, such conflicts shall be reported to the Engineer. If such action is not taken, the Contractor, as applicable, shall furnish such items as part of his work, for complete and operable systems and equipment, as determined by the Engineer.

1.03 REGULATIONS AND STANDARDS

A. The completed installation and all materials and equipment shall conform to local ordinances and codes, other regulations and standards listed herein or in related sections. These are intended as a minimum and shall be exceeded if required by the specifications or the Drawings. In the event of conflict between the codes, standards, or regulations, and information contained in the Contract Documents, the applicable code, standards, or regulation shall take precedence.

B. Refer to Division 01 and Supplementary Instructions to Bidders for construction permitting requirements.

1.04 INSPECTION CERTIFICATES

A. The Contractor shall furnish three copies of certificates of final acceptance to the Engineer from all inspection authorities having jurisdiction.

1.05 SUBSTANTIAL COMPLETION INSPECTION

A. The Engineer will visit the site for the purpose of conducting a substantial completion inspection once the following items have been met by the Contractor:

1. All HVAC systems shall be complete, operational and under automatic control.
2. HVAC systems cleaning, balancing, and testing as described in Section 23 05 93 shall be complete and the final report shall be approved by the Engineer.
3. Letters, signed by representatives of the manufacturer, for the boiler, chiller, cooling tower, heat pump, and air conditioning unit shall be provided attesting that their respective equipment has been started, tested, and set to operate safely and at the control points required as an integral part of the systems in which they are installed.
4. A letter, signed by a representative of the temperature controls manufacturer as described in Section 23 09 00, shall be provided attesting that the installation of the temperature controls system is complete, proper control of all equipment, valves, dampers, and the like

has been verified, set points have been established to provide proper control of installed equipment, and graphics are accurate with real time data.

5. The Contractor shall provide certification from an authorized official of the equipment manufacturer(s) stating that all refrigerant piping as described in Section 23 20 00 and specialties have been installed in accordance with the manufacturer's recommendations.
6. The noise and vibration control supplier as described in Section 23 05 48 shall provide a letter stating that all items have been installed properly and that all equipment is adequately isolated and/or restrained.
7. The Contractor shall attest by letter that all equipment has been wired and tested to verify that the indicated sequence of motor control is established, that all safety controls function properly, that all motor protective devices are sized correctly, and that the systems are operating at the proper set points.
8. Certificate of inspection for all boilers and pressure vessels shall have been completed.
9. The Contractor shall attest by letter, the quantity of glycol required to bring the system to the specified percentage. Letter shall state the total volume of glycol added to the system and shall include the total system volume as calculated from the percentage.
10. Completed filter change log for all units operated during Construction. Refer to temporary requirements hereinafter.
11. A certificate of test to the Engineer and AHJ for all refrigeration systems containing 55 pounds or more of refrigerant. The certificate shall give the test date, name of the refrigerant, test medium and the field test pressure applied to the high-pressure side and the low-pressure side of the system. The certification of test shall be signed by the Contractor and shall be made part of the public record.

B. All discrepancies noted in the substantial completion report shall be corrected prior to the final inspection. The Contractor shall provide a detailed item-by-item description of all corrections made for each item on the substantial completion discrepancy list prior to scheduling final inspection by the Engineer. Additional visits required after the final inspection, for the reason that previously documented discrepancies had not been corrected at the time of the final inspection, will be made at the Contractor's expense.

1.06 ASBESTOS

A. Asbestos Free Materials: The intention of these Drawings and specifications is that there are no asbestos-containing materials installed on this project. To the best of the Architects and Engineers knowledge, none of the material or equipment specified herein or shown on the Drawings contains asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos-containing materials were used for or in the construction of this project.

B. Existing Materials:

1. Contractor shall review the Owners asbestos management plan to ensure suspected asbestos containing materials are under surveillance.
2. Discovery: If during the construction of this project, work involving friable asbestos is suspected, or encountered, all work in this area shall be discontinued and the Owner or the Owner's representative, shall be notified immediately and the Owner with his own forces or by separate contract shall be responsible for complete investigation, removal, and disposition of the friable asbestos hazard in accordance with applicable laws and regulations. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the Contract Documents.
3. Removal: All work involving the removal of friable asbestos will be done under a separate contract.

1.07 MATERIALS AND WORKMANSHIP

A. Equipment and material used in the project shall be new and undamaged. The mechanical installation shall fit into the space allotted and shall allow adequate and acceptable clearances

for entry, servicing and maintenance. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise. Work shall be performed by mechanics or tradesmen skilled in the trade involved.

B. All ductwork, piping and conduit shall be installed in a neat and organized manner, parallel to other work and the nearest building elements, unless specifically shown otherwise on the Drawings.

C. Equipment and materials shall be suitable for use in the environment in which they are installed. Equipment exposed to outside conditions shall be adequately protected from the weather, manufactured from materials suitable for outdoor use, and designed specifically for use in outdoor environments.

1.08 SUBMITTALS

A. Submit shop drawings, product data and samples in accordance with Division 01 for all items as specified in related sections of these specifications. One (1) electronic (PDF) copy of the submittal shall be submitted. One (1) electronic (PDF) copy of the submittal will be returned to the Contractor. If additional copies are required, they will be the responsibility of the Contractor. Where drawings are submitted, the Contractor shall submit a minimum of two (2) sets of full scale prints. One (1) copy will be marked and returned to the Contractor, and the Contractor shall be responsible for all additional copies required for his use. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements. Contractor's stamp shall identify the specification section, paragraph, and page number for which the submittal is being made. Shop drawings will be reviewed only for general compliance with the Contract Documents. Review will not include correctness of details, proper configuration, utility connections, dimensions, sizes, quantities, and the like. Any submission which has not been reviewed and stamped by the M/E Subcontractor will not be reviewed by the Engineer. No reviews prior to award of Contract will be considered or accepted. Re-submissions of shop drawings, product data and samples shall include the entire original submittal. Partial submittals will not be reviewed by the Engineer.

B. Submissions will be stamped by the Engineer in one of the following ways:

"No Exceptions Taken"	No exceptions are taken and subject to compliance\ with the Contract Documents.
"Make Corrections Noted"	Minor corrections are noted and a re-submittal is not required subject to compliance with the corrections and the Contract Documents.
"Correct and Resubmit "	The submitted material, method or system meets the intent of the specifications, yet has insufficient data to determine compliance with the Contract Documents. Re-submittal is required.
"Rejected"	The submitted material, method or system does not meet the intent of the specifications, or has insufficient data to determine compliance with the Contract Documents.

C. Submission Procedures:

1. If a submission is satisfactory to the Engineer, the Engineer will annotate the submission, "No Exceptions Taken" or "Make Corrections Noted" and transmit the electronic copy to the Contractor. If a resubmission is required, the Engineer will annotate the submission

“Correct and Resubmit” or "Rejected" and transmit the electronic copy to the Contractor for appropriate action.

2. The Contractor shall revise and resubmit submissions as required by the Engineer until submissions are acceptable to the Engineer.
3. Approval of a working and/or shop drawings by the Engineer will constitute acceptance of the subject matter for which the drawing was submitted and not for any other structure, material, equipment or appurtenances indicated as shown.
4. The Engineer's review of the Contractor's submissions shall in no way relieve the Contractor of any of his responsibilities under the Contract. An approval of a submission shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Documents.
5. Where as-built drawings, record drawings and specifications are available and when provided to the Contractor for use in performing the work, the Contractor shall verify the content of such drawings and specifications, the suitability of their use in performing the work and their accuracy for the purposes in which the Contractor intends to use any record or historical documents which may be obtained. In no case shall the Contractor assume that such documents reflect a true and accurate record of the construction. Acceptance of any such materials, records, and/or drawings shall in no way result in additional cost to the Owner should an error and/or omission in these documents result in additional costs to the Contractor.
6. When major equipment being submitted is a different manufacturer or model than the basis of design, the shop drawing shall include sketches of the proposed equipment and associated service clearances overlaid against other equipment and architectural features.
7. All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.
8. On the first pages of all submittals, the Contractor shall provide a table showing all individual specification section paragraphs and drawings that apply to the equipment/component and a statement for each paragraph and drawing that the requirements have been met. The table shall be similar in format to the following, but shall include all relevant specification paragraphs and drawings:

Section 23 07 00 (example)	
1.2 A	Comply
1.2 B	Comply
1.3 A	Comply
1.3 B	Comply
1.3 C	Comply
1.4 A	Comply
1.4 A.1	Comply
1.4 A.2	Comply
Drawing M0.01	Comply

D. Equivalents: Manufacturers, trade names, and model numbers indicated herein and on Drawings shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Unless definitely stated otherwise and upon complying with Division 01, the Contractor may use any article which, in his judgment is equal to that specified and is

accepted by the Engineer. (The ten day prior approval requirements of Instructions to Bidders (AIA Document A701) are waived for this Division of the Specifications, and unless stated otherwise the Contractor may use items that he deems as equivalent in quality and performance to the specified item subject to final acceptance of substituted items by Engineer upon his review of shop drawings.) Where three (3) or more manufacturers are named in the specifications for any item, the Contractor shall use one of the named manufacturers. No others will be reviewed or accepted. Manufacturers listed first in these specifications and on Drawings were used as a basis of design. It will be the responsibility of the Contractor to verify all connections, physical sizes, capacities, etc. of all other manufacturer's items, both named or proposed. If the equipment necessitates changes in ductwork, piping, wiring or other building systems from that indicated on the Drawings, the Contractor shall be responsible for all additional costs included and notify other trades. Where such changes are required, detail drawings indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval.

E. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials where specifically required by specification and all items identified with an [S] behind the product title. Submittals not required by the Contract Documents will not be reviewed.

F. Operation and Maintenance manual(s) shall be submitted in accordance with Division 01 and shall include a complete product index in each volume, installation and maintenance data, sequence of controls, parts lists, a copy of all approved shop drawings and the name, address and telephone number of supplier or nearest representative. All mechanical devices, equipment and systems marked [O/M] in these specifications shall be included and all other such mechanical items that will require servicing before the duration of its useful life has been reached. Manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.

1.09 WARRANTY

A. The Contractor shall provide a warranty for a period of one year for all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.

B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.

C. Refer to Division 01 for additional warranty requirements.

D. Information on all warranties shall be included in the O&M Manuals specified herein to be provided to the Owner.

E. In phased construction, warranties shall not begin until substantial completion of the FINAL phase. Contractor shall maintain all new equipment and systems until that time. Owner will maintain all existing equipment and systems. Where new systems are connected to existing, the Contractor and Owner shall determine coordination of maintenance responsibilities at the preconstruction meeting.

1.10 EXCAVATION AND BACKFILLING

A. General: Excavation and backfilling shall be as specified in Division 31. Backfilling shall not commence until all tests have been performed and all utility systems conform to the Contract Documents.

B. Protection of Existing Utilities: Existing utility lines to be retained, whether known or unknown and uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be restored to original condition.

1.11 INTERRUPTION OF UTILITY SERVICES

A. It is necessary that close liaison be maintained with the Administrative Authorities in all matters affecting interruptions of any utility services serving the facility and existing buildings. Prior to interrupting any utility service, the Administrative Authorities shall be consulted and interruptions for connections made at a time (or times) suitable to the Administrative Authorities. Work shall be laid out and planned to limit the interruption times to a minimum.

1.12 COORDINATION OF WORK

A. General: The Contract Documents indicate the extent and general arrangement of the mechanical systems. The Contractor shall be responsible for the coordination and proper relation of the mechanical work to the building structure and to the work of other trades. No additional compensation or extension of completion time will be granted for extra work caused by the lack of coordination.

B. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, the building construction.

C. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the mechanical Drawings are intended only as a guide to indicate relative locations of the mechanical work. Refer to architectural and structural Drawings for building construction details. The Contractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination shall be completed to verify dimensions and characteristics for the installation of each system.

D. Unless necessitated by equipment access or otherwise indicated in the Contract Documents, all piping, ductwork, and conduit concealed above ceilings and in finished or utility spaces shall be routed as high as possible.

E. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall provide manual air vents and drains as required for his work to affect these offsets, transitions and changes in direction, as applicable.

F. Cutting and Patching: See Division1.

G. (Cutting and Patching: Unless stated otherwise, the Mechanical Trade shall do all cutting necessary for the installation of his work. All work should be installed sufficiently in advance of new construction in order to permit installation of supports, sleeves, and similar items without cutting. Patching and repair work shall exactly match new and existing adjacent work in all respects and shall not be obvious as patching. Cutting which will in any way affect the building structure shall not be performed without permission of the Architect-Engineer. The Mechanical Trade is responsible for patching where he does cutting. Patching shall be done to the satisfaction of the Architect-Engineer.)

H. Roughing-In: Verify the locations of other buildings machines, door swings, block coursing, alignment of tile end and other similar features before roughing-in for mechanical equipment components and/or controls.

I. Damage to Other Work: Each Contractor is responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Contractor who installed the work, and as directed by the Architect-Engineer; the cost of which shall be paid for by the Contractor responsible for the damage.

1.13 EQUIPMENT INSTALLATION

A. General: Equipment shall be installed in accordance with manufacturer's instructions to conform with the details and application indicated. Where manufacturer's recommendations or

installation instructions require options or accessories not specified, they shall be included and installed by the Contractor.

B. Supports: Provide necessary supports for all equipment and appurtenances as required; this includes but is not limited to frames or supports for items such as tanks, compressors, boilers, plumbing fixtures, pumps, valves, fans, and other similar items requiring supports. Floor mounted equipment in Equipment Rooms shall be set on 4-inch high concrete foundation pads unless shown otherwise. All pads shall be poured such that the top of the pad is level. Foundation drawings, bolt setting information and foundation bolts shall be furnished by the subcontractors furnishing the equipment for all equipment required to have concrete foundations. Concrete for foundations shall be provided by mechanical subcontractor unless indicated otherwise. Except where indicated in Section 23 05 48, all equipment shall be anchored to concrete pads. (Provide additional structural steel supports under air handlers where required to achieve correct elevation for (steam traps and) cooling coil condensate drains. Structural supports shall be firmly anchored to concrete housekeeping pads. Air handler or vibration isolators shall be firmly anchored to structural supports.) Rooftop equipment, ductwork, and piping shall be set on pre-manufactured curbs anchored to the roof and flashed into the roofing system. Rooftop equipment, ductwork, piping, etc. shall be anchored to the curb except where vibration isolation is installed between the curb and the equipment. Unless otherwise noted, outdoor equipment (on grade) shall be installed on 4-inch thick cast-in-place concrete equipment pads.

C. Service Area: All equipment and appurtenances shall be located to permit adequate service clearance in accordance with manufacturer's recommendations and as otherwise required. Service clearance shall include but not be limited to service and removal of filters, coils, motors, controls and removal of equipment sections. Service clearance shall include adequate space for rodding and removing tubes from boilers, chillers, and heat exchangers. All piping, ductwork, and other equipment shall be located outside of the service area or shall be flanged for easy removal to facilitate equipment service. All equipment shall be located with sufficient distance from building features, structural components, and the equipment of other trades. Service clearance in front of electrical panels shall be minimum as required by National Electric Code (NEC) where applicable. Equipment requiring service and located above ceiling shall be located within two feet of the ceiling vertically to allow for proper maintenance access.

D. Temporary Requirements: Temporary filters shall be provided for all fans that are operated during construction. Return openings, grilles, and registers shall be provided with temporary filters to prevent the intrusion of dust and particulate into the return air ductwork. Temporary filter shall have a minimum efficiency of MERV 8 in accordance with ASHRAE 52.2. Contractor shall provide a written report detailing the location and type of filter being used for approval by Engineer prior to operating any unit during construction. Report shall also include a filter change interval and log along with pictures of all the interiors of any units intended to be operated. Photos shall include the upstream side of all coils and energy recovery devices. Openings in equipment shall be kept plugged at all times until connection is made to the system. The ends of all pipes, ducts and equipment openings shall be kept plugged or capped properly with approved devices. Approved devices are items such as specially molded plastic caps, pipe plugs, test plugs and sheet metal caps.

E. All equipment indicated to be installed exposed within finished spaces shall be installed such that all conduit, piping, and appurtenances are concealed. Air conditioning units utilizing gravity condensate drains shall be installed at an elevation necessary for the specified pipe slope.

1.14 EXISTING EQUIPMENT

A. General: Care shall be exercised to protect all existing equipment to be reused. The Contractor shall remove from operation all equipment that is shown to be reused and provide adequate protection including but not limited to prevention of corrosion, protection of seals, prevention of leaking, and prevention of internal/external contamination. All electronic

components shall be protected from weather and moisture, deterioration and loss of programming.)

B. SLEEVES AND INSERTS

C. General: Sleeves and inserts shall be provided and correctly located in the structure, as require for the work.

D. Inserts shall be steel and proper size for loads encountered.

E. Sleeves shall be provided for all pipes passing through concrete or masonry walls, partitions, concrete beams or slabs installed during construction of the wall, partition, beam or slab. Sleeves through existing concrete walls and slabs may be omitted if wall or slab can be core drilled and properly sealed in a manner acceptable to the Engineer. Sleeves placed horizontally in walls or in any position in beams shall be standard weight ASTM A53 steel pipe of length equal to thickness of wall or beam. Those placed vertically in non-waterproof floors shall be 20 gauge galvanized sheet steel of length equal to thickness of slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. Sleeves occurring in floors of rooms where hose bibs or floor drains occur, and in pipe spaces, shall be standard weight steel pipe projecting 2" above the finished floor except in Equipment Rooms they shall project four (4) inches above floor. Sleeves in floors with waterproof membrane shall be provided with flanges or flashing rings and shall be clamped or flashed into membrane. All sleeves (and core drilled openings) shall be of sufficient diameter to clear bare or covered pipes by 1/4" all around except sleeves on lines subject to movement by expansion which shall clear the bare pipe or insulation on insulated pipe at least one inch all around. Pipes through exterior walls below grade and above footings shall be installed in sleeves having a minimum size of two larger pipe diameters and sealed watertight with flexible synthetic rubber seals. Sleeve shall have anchor and water stop plate. The entire assembly shall be tightened and adjusted and made watertight. Sleeves for pipes and conduit, penetrating fire (and smoke) rated partitions, walls and floors shall be sealed in accordance with the terms of U.L. Listed Through-Penetration Firestop Systems XHEZ as published in the U.L. Fire Resistance Directory. Penetrations shall exactly conform to details of the Firestop System indicated for the type of partition, wall and floor construction encountered. All penetrations through non-fire resistance rated floor assemblies and through the ceiling membrane of non-fire resistance rated roof assemblies shall be fire blocked with tightly packed mineral-wool insulation secured in place. All penetrations through equipment room walls and other areas of noise or heat generation shall be tightly sealed with mineral fiber rope. All penetrations through draft stop partitions shall be sealed to maintain the integrity of the partition. All firestopping and draft stopping of sleeves for mechanical work shall be provided under Division 23.

1.15 PENETRATIONS THROUGH PRE-CAST HOLLOW-CORE SLAB SYSTEM

A. General: Contractor shall coordinate work with the pre-cast system. Refer to architectural and structural documents for details. Installation of work shall be in strict accordance with the pre-cast system manufacturer's recommendations, as approved by the Architect.

B. Openings: Holes in the slabs made in the field shall be made by the trade involved. Openings shall be made only through hollow cells, shall not exceed the width of the hollow cells, and shall not penetrate the webs between the cells or the pre-stressed strands unless prior approval is obtained from the Architect and the slab manufacturer. Holes shall not exceed 6" diameter without approval. Certain holes for pipe and duct shafts may be pre-cut. See structural Drawings for locations.

C. Cutting holes: Holes may be drilled or cut and trimmed with a chisel. Generally, holes will be made by cutting the outline of the hole through the lower portion of the slab from the underside and then cutting out the top side. All holes shall be made prior to the installation of the topping slab.

D. Sleeves: Sleeves are not required through pre-cast system slabs except where required to support packing material at hollow cores. Sleeves are required to be placed through concrete topping slab on top of the pre-cast slabs.

E. Supports: Hangers shall be supported from inserts or approved sockets, or toggle bolts in core slab construction. Hanger spacing shall be such that weight on hanger does not exceed 250 pounds for any one hanger. All hanger rods shall be minimum 3/8 inch in diameter. Where hanger rods must extend through slab, they shall be secured by two bolts over steel washers or plates on top of the slab in the floor fill or roof insulation space. Washers or plates shall not be less than 2" size and 1/4" thick. Larger plates are required for larger pipe supports. Cumulative thickness of plates, washers and bolts shall be 1/4" less than thickness of topping slab.

F. Explosives: Inserts set with explosives shall not be used.

1.16 ESCUTCHEONS

A. Where pipes pass through floors, walls or ceilings in finished rooms, they shall be fitted with chromium plated escutcheons of suitable pattern to effectively cover the rough opening. Where sleeves project above floors, special deep type escutcheons shall be provided.

1.17 ACCESS DOORS

A. Provide for all concealed valves, controls, dampers, junction boxes, equipment, or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for Mechanical work shall be furnished as a part of this Division to the General Contractor for installation. The Mechanical Contractor shall provide locations of all access doors such that service may be safely performed from a ladder, lift, or platform without the need for support from the ceiling system. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction. Doors occurring in rated construction shall be fire rated U.L. labeled access doors correlated to preserve the integrity of the rated construction. Doors leading to concealed spaces shall be provided with means to open from the inside. Doors shall be prime finish steel except those in toilets, shower rooms, locker rooms, kitchens and other similar areas shall be stainless steel with brushed finish.

1.18 ELECTRICAL WIRING AND EQUIPMENT

A. Wiring, low voltage (100 volts or less) control wiring shall be provided as a part of (Section 23 09 00 Instrumentation and Control for HVAC) (Division 23) in strict accordance with Division 26 and shall be in accordance with manufacturer's recommendations to comply with the sequence of control indicated. Verify that wiring of all motors and controls required by equipment furnished is accomplished for the correct sequence of operation.

B. Wiring, line voltage (101 volts or higher) power or control wiring shall be furnished and installed under Division 26.

C. Disconnects shall be provided for each item of equipment under Division 26 unless specified otherwise in other sections.

D. Miscellaneous manual or automatic control and protective or signal devices required for the sequence of operation indicated for mechanical equipment shall be provided under the section of the specifications where the item of equipment is specified unless indicated otherwise.

1.19 PROTECTION FROM MOVING PARTS

A. Belts, pulleys, chains, gears, shafts, couplings and other rotating or moving parts located so that any person may come in close proximity thereto shall be fully enclosed or properly guarded.

1.20 RECORD OF UNDERGROUND LINES

A. Maintain a continuously updated record of underground utility installation deviations from the Contract Drawings. At Project Closeout, submit a Record Underground Utilities package consisting of:
   1. Record drawings in PDF, clearly marking deviations and including dimensions.
   2. Native CAD/BIM files for drawings/models that were originally issued in CAD/BIM formats (DWG and/or model format), updated to reflect as-installed conditions.
   3. Field-verified dimensions showing:
   4. Locations of cleanouts.
   5. Distances from building face (or established control line) to outside sewers, mains, and manholes.
   6. Utility routes, sizes, and depths/elevations, referenced to project datum and fixed, permanent site/building features.
   7. Include contractor certification that record information reflects as-installed conditions based on field measurements taken prior to backfill.

1.21 CHARTS AND DIAGRAMS

A. General: Material as listed below shall be provided by the Contractor and shall be mounted in separate hardwood frames where directed in the field or folded and stored in a plastic document folder and located in the control cabinets. All charts, diagrams and schemes shall be photographic positives prepared from original tracings. A copy of charts and diagrams shall be included with O/M manuals.

B. Automatic Temperature Control Diagrams identified as to name, sequence of operation, location and number of systems. Components of a control system shall be identified as to location, function, temperature setting and manufacturer's part number.

C. Electric Sequence Control Diagrams of entire Mechanical system.

D. Charts for identification of valves.

E. Thermal Envelope Certificate: A permanent thermal envelope certificate shall be provided. Certificate shall be posted on a wall in the space where the space conditioning equipment is located, a utility room, or other approved location. If located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. A copy of the certificate shall also be included in the construction files for the project. The certificate shall include the following:
   1. R-values of insulation installed in or on ceilings, roofs, walls, foundations and slabs, basement walls, crawl space walls and floors and ducts outside conditioned spaces.
   2. U-factors and solar heat gain coefficients (SHGC) of fenestrations.
   3. Results from any building envelope air leakage testing performed on the building.
   4. Where there is more than one value for any component of the building envelope, the certificate shall indicate the area weighted average value where available. If the area-weighted average is not available, the certificate shall list each value that applies to 10 percent or more of the total component area.

1.22 INSTRUCTION OF OWNER'S REPRESENTATIVE

A. Contractors shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the Mechanical systems. Competent representatives of the Contractor shall spend such time as necessary to fully prepare the Owner to operate and maintain the Mechanical and Electrical systems.

1.23 COMMISSIONING OF HVAC SYSTEMS:

A. Commissioning of this project will be coordinated and managed by the Owner's Commissioning Agent. Refer to the Commissioning Plan and Division 01 for the scope and requirements for commissioning of mechanical systems.

1.24 CONSTRUCTION STATUS REPORT

A. Each item of discrepancies noted on Construction Status Report prepared by the Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

1.25 GRAPHICS DATABASE

A. This project's Computer Aided Design & Drafting (CADD) drawing files may be obtained through the Architect/Engineer for use in preparing computer graphics specific to this project. See Appendix A at the end of this Section for Letter of Indemnification and ordering instructions.

1.26 DEMOLITION

A. Contractor shall visit site before bidding to determine extent of demolition.

B. Removal of Ducts, Piping and Equipment: Remove all ductwork and piping connections, plugging outlets, etc., such that are not required for present equipment and fixtures, or are not reused or needed for reconnecting new equipment and fixtures. Remove all equipment, fixtures, etc., indicated to be removed, or not reused or needed after the renovations are complete.

C. Where piping, conduit, ductwork or other similar items passing through rated assemblies are removed; the assemblies shall be patched in accordance with UL so as to maintain the integrity of the assembly.

D. Where demolition of equipment, pipes, conduit, ducts or other components occurs in a finished space, all ceilings, floors, walls, and casework or other affected building elements shall be patched to match existing finishes and construction.

E. The Owner will select and retain such existing equipment and materials which are indicated to be removed and not reused, as he desires. All other existing equipment and materials indicated to be removed and not reused shall become the property of the Contractor, who shall promptly remove them from the premises. All existing equipment and fixtures indicated to be relocated shall be disconnected, removed, relocated and reconnected. All equipment and fixtures shall be protected from damage during demolition.

F. Miscellaneous: In all altered portions of the buildings, the Contractor shall remove or alter as necessary all existing mechanical work that is not coordinated to operate with the new construction. Demolition shall not begin until the work schedule is approved by the owner. The work shall be scheduled to prevent any disruption to the normal operations of the building.

G. Demolition shall be closely coordinated with the construction phasing plans to maintain operation of all existing systems until such time the planned demolition can be fully completed.

H. General Scope of Demolition:

1.27 PHASING OF WORK

A. Coordinate phasing requirements with Division 01.

B. The Mechanical Contractor is required to fully understand the phasing of work and to coordinate his work accordingly.

C. Where phasing of the work requires appurtenances not otherwise indicated on the Drawings, they shall be provided as part of the Contract. This includes, but is not limited to; isolation valves, temporary ducting, temporary piping, and similar.

D. During renovation, sections of the existing building may continue to be occupied. The Contractor shall be responsible for retaining existing HVAC systems to serve the occupied sections of the building, otherwise the contractor shall provide temporary systems for the occupied sections of the building capable of maintaining current temperature and humidity setpoints.

E. The Contractor shall fully comprehend the need to operate HVAC systems during construction and shall seal off ductwork serving areas under construction, including providing temporary filters on all air inlets.

F. Temporary HVAC systems shall be sized as noted on drawings or if no size provided, shall be of sufficient capacity to protect the Owners property from freezing and high humidity. In new work areas, capacity shall be such to allow for proper drying and application of finishes.

G. During renovation, portions of the renovated building may be reoccupied as sections become complete. The Contractor shall maintain HVAC for the occupied sections of the building for the remainder of the project.

H. Any necessary shut downs shall be limited in scope and duration and shall be fully coordinated with, and preapproved by, the Owner.

I. (The addition of glycol to the system shall only occur after the last piece of equipment has been installed. Prior to that point, temporary control sequences for freeze protection shall be utilized.)

J. All airside systems shall be tested and balanced at the end of the phase in which they are installed. In addition, each air system shall be backchecked as part of the final phase. Backcheck shall constitute a sampling of no less than 25% of each of the system components (air terminals and equipment). Where more than 25% of the sampled items do not meet the previous submitted values for any individual system, the entire system shall be rebalanced.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

END OF SECTION

APPENDIX A
LETTER OF INDEMNIFICATION

Project Name:

Project Location:

At the Contractors request, Stratus will provide electronic files of the Revit Models for their convenience and use, subject to the following terms and conditions:

Stratus electronic files are compatible with Autodesk Revit Product version for which they were designed. Autocad files will be provided in the Autocad 2018 DWG format. Stratus makes no representation as to the compatibility of these files with your hardware or your software.

Data contained on these electronic files is part of Stratus's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of project layout for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to Stratus. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Stratus, its officers, directors, employees, agents, or subconsultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless Stratus from all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to Addenda, Change Orders, or other revisions. Stratus makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed documents prepared by Stratus and the electronic files, the signed Contract Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm, and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

The use of the Revit Model files prepared by the Engineer shall not in any way negate the Contractor's responsibility for coordination with other trades or for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

All information added to the drawings by the Contractor shall be in a distinctively heavier pen weight and different font, such that all Contractor information can be clearly distinguished from the original files.

Any information added by the Contractor, which represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, Stratus reserves the right to remove all indicia of its ownership and/or involvement for each electronic display.

Under no circumstances shall delivery of the electronic files for use by you deemed a sale by Stratus, and Stratus makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall Stratus be liable for any loss of profit or any consequential damages.

The Engineer believes that no licensing or copyright fees are due to others on account of the transfer of the Revit Model files, but to the extent any are, the Contractor will pay the appropriate fees and hold the Engineer harmless from such claims as may arise.

Any purchase order number provided by the Contractor is for the Contractor's accounting purposes only. The Contractor's purchase order terms and conditions are void and are not a part of this agreement.

The Recipient further agrees that the drawing files will only be used in graphics preparation for the above-referenced project.

Company Name of Recipient: _____

Recipient's Designated Representative: _____

Title: _____

Signature: _____

Address: _____

Return to: Stratus
5228 Valleypointe Parkway, Suite 4
Roanoke, VA 24019
Stratus # 2026-0302

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SECTION 23 0100

OPERATION AND MAINTENANCE OF HVAC SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. To aid the continued instruction of operating and maintenance personnel, and to provide a source of information regarding the products incorporated into the work, furnish and deliver the data described in this section and in pertinent other sections of these specifications.

C. Related Sections:

1. Section 23 00 10 – HVAC General Requirements
2. Section 23 05 00 – Common Work Results for HVAC
3. Section 23 20 00 – HVAC Piping and Pumps
4. Section 23 30 00 – HVAC Air Distribution
5. Section 23 80 00 – Decentralized HVAC Equipment

1.02 SUBMITTALS

A. Unless otherwise directed in other sections, or in writing by the Engineer, submit three copies of the final manual to the Engineer for approval prior to indoctrination of operation and maintenance personnel.

B. Operation and Maintenance manual(s) shall be submitted in accordance with Division 1 and shall include a complete product index in each volume, installation and maintenance data, sequence of controls, parts lists, a copy of all approved shop drawings and the name, address and telephone number of supplier or nearest representative. All mechanical devices, equipment and systems marked [O/M] in these specifications shall be included and all other such mechanical items that will require servicing before the duration of its useful life has been reached. Motor driven equipment shall include data for the motor. Manual(s) shall be presented to the Engineer for review and transmittal to the Owner before final payment is recommended.

1.03 QUALITY ASSURANCE

A. In preparing data required by this section, use only personnel who are thoroughly trained and experienced in the operation and maintenance of the described items, completely familiar with the requirements of this section, and skilled communicating the essential data.

PART 2 - PRODUCTS

2.01 INSTRUCTION MANUALS

A. Where instruction manuals are required to be submitted under other sections of these specifications, prepare in accordance with the provisions of this section.

B. Format:

1. Hard Copy
   a. Size: 8-1/2" x 11"
   b. Paper: White bond, at least 20 lb. weight.
   c. Text: Typed (Hand printed or written is not acceptable)

d. Drawings: 11" x 8-1/2" preferable; bind in with text; foldouts are acceptable; larger drawings are acceptable if folded to fit within the manual and provide a drawing pocket inside rear cover or bind in with text.
e. Fly Sheets: Separate each portion of the manual with neatly prepared Fly Sheets or tabbed index sheets briefly describing the contents of the ensuing portion. Fly sheets or index tabs may be in color.
f. Binding: Use heavy-duty plastic covers with binding mechanism concealed inside the manual; 3-ring binders are required. All binding is subject to the Engineer's approval.

2. Electronic
a. A single PDF file shall be provided for the entirety of Division 23. Individual PDF files of each section are not acceptable and will not be reviewed.
b. All submissions must be provided with a digital table of contents with linked bookmarks to allow for quick access to each section. Table of Contents shall be ordered by specification section. Bookmarks shall be linked to the fly sheets of the corresponding section.
c. All PDF's must be searchable utilizing the standard search function of a PDF viewer.
d. Where native PDF files are available from a vendor, those shall be used. Scanned versions of these documents are not acceptable.
e. Fly Sheets: Separate each portion of the manual with neatly prepared digital Fly Sheets briefly describing the contents of the ensuing portion. Fly sheets shall include the equipment type, applicable specification section, and address and telephone number of equipment supplier or nearest representative. Table of contents bookmarks shall point to the related fly sheet.

C. Provide front and back covers for each manual, using durable plastic material approved by the A.E, and clearly identified on the front cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS FOR

(Item/system name and description)

(Name and address of Contractor and sub-contractor)

(General subject of this manual)

(Name and address of Engineer)

(Engineer's approval and date approved)

D. Contents:

Neatly prepared and typewritten detailed table of contents.
Complete instructions regarding operation and maintenance of all equipment involved including lubrication, disassembly, and reassembly.
Complete nomenclature of all parts of all equipment.
Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor, and all other data pertinent to procurement procedures.
Copy of all guarantees and warranties issued.
Manufacturer's bulletin, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.
Such other data as required in pertinent sections of these specifications.

PART 3 - EXECUTION

3.01 INSTRUCTION MANUALS

A. Revisions:

1. Following the indoctrination and instruction of operation and maintenance personnel, review all proposed revisions of the Manual with the Engineer.

3.02 TRAINING

A. Upon completion of the work and at a time designated by the Owner`s representative, provide a formal training session for the Owner`s operating personnel to include location, operation, and maintenance of all mechanical equipment and systems.

END OF SECTION

SECTION 23 0500

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Common Motor Requirements for HVAC Equipment
2. Variable Frequency Drives
3. Expansion Fittings for HVAC Piping
4. Meters and Gages for HVAC Piping
5. General-Duty Valves for HVAC Piping
6. Hangers and Supports for HVAC Piping and Equipment

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 48 – Vibration and Seismic Controls for HVAC Systems
4. Section 23 05 53 – Identification for HVAC Piping and Equipment
5. Section 23 05 93 – Testing, Adjusting and Balancing for HVAC
6. Section 23 09 00 – Instrumentation and Control for HVAC
7. Section 23 20 00 – HVAC Piping and Pumps
8. Section 23 30 00 – HVAC Air Distribution
9. Section 23 80 00 – Decentralized HVAC Equipment

1.02 REFERENCES

A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.

B. American Society of Mechanical Engineers (ASME):

C. ASME 95 Boiler and Pressure Vessel Code

D. B16.3 Malleable Iron Threaded Fittings

E. B16.4 Cast Iron Threaded Fittings

F. B31.9 Building Services Piping

G. National Electrical Manufacturers Association (NEMA)

H. Underwriters Laboratories, Inc. (UL)

1.03 COMMISSIONING OF HVAC SYSTEMS:

A. The Contractor shall provide contact information to the Commissioning Agent indicated in Division 1 for all major items of Equipment.

B. Provide additional submittal copy of major equipment for Commissioning Agent specified in Division 1.

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with Division 1 and Section 23 00 10.

B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.

C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.

PART 2 - PRODUCTS

2.01 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

A. Motors shall be provided in place as an integral part of the driven equipment, ready for electrical connections. Motors shall be in accordance with NEMA Standards and of design suitable for the starting and running characteristics of the driven equipment. Motors over 5 HP shall be "premium" efficiency as defined by NEMA MG-1, latest edition.

B. All three phase motors over 5 HP shall be provided with minimum power factor of 90%. Power factor correction capacitors shall be provided if required and shall be furnished to the electrical subcontractor for installation. Shop Drawing submittals for motors over 5 HP shall list efficiency and power factor. Unless specified otherwise, all motors shall have continuous duty classification, 40° Centigrade ambient temperature, shall have enclosure suitable for indicated application and shall be wound for 120 volt, single phase, 60 cycle current, except motors above 1/2 horsepower (unless indicated otherwise) shall be wound for 200V or 230V/460V as required by the secondary voltage specified for main service in Division 26. Each motor shall be selected and rated at the voltage indicated so that the driven load does not exceed the nameplate rating and service factor of the motor. All motors 460V/480V 20 HP and above and 208V/230V 10 HP and above shall be wound for wye-delta (6 or 12 lead) starting with capabilities of being wired for across-the-line starting.

C. Motors for use with variable frequency drives (VFD):
   1. Dual-Mode Suitability: Provide motors suitable for operation from PWM VFD output and for full-voltage across-the-line operation when operating on bypass.
   2. Inverter Duty / Insulation: Motors shall be Inverter Duty suitable for VFD applications in accordance with NEMA MG 1, Part 31 (latest edition), minimum Class F insulation system.
   3. Thermal Protection / Coordination: Provide motor thermal protection suitable for VFD operation. Where motors are furnished with embedded thermal devices (thermistors/RTDs), provide wiring/terminations for connection to the VFD/motor protection inputs so thermal protection remains effective in both VFD and bypass modes.
   4. Bypass Coordination: Motor nameplate data (voltage, phase, Hz, FLA, service factor) shall match scheduled equipment and be coordinated with the VFD and bypass assembly. Provide motor leads/termination arrangement compatible with the specified bypass scheme and across-the-line starting.
   5. Speed Range / Cooling: Motors shall be capable of continuous operation over a minimum 4:1 speed range (60 Hz down to 15 Hz) without exceeding motor temperature rise limits. Where operation below 15 Hz or sustained low-speed torque is required, provide auxiliary cooling or select a motor rated by the manufacturer for the required range.
   6. Bearing Current Mitigation: Motors for VFD service shall include bearing-current mitigation: shaft grounding device and/or insulated bearing arrangement as recommended by the motor manufacturer for inverter-fed service to prevent premature bearing failure.
   7. Power Factor Correction: Do not install power factor correction capacitors on the load side of a VFD. Provide capacitors only on the line side where required and coordinated with the VFD manufacturer and harmonic mitigation strategy.
   8. Harmonics (System Requirement): Coordinate VFD selection and any mitigation so harmonic distortion at the Point of Common Coupling (PCC) complies with IEEE Std 519 (latest edition).

D. Where 2-speed motors are indicated for motors above 1/2 horsepower, motors shall have two separate windings.

E. Motor starters and motor protective switches shall be provided under Division 26 except where specified to be furnished specifically with the driven equipment. Accessories such as auxiliary contacts, hand-off-automatic switches, start-stop switches, pilot lights, control power

transformers and other similar items shall be provided in or on the controllers as required by the control sequence indicated. Starting equipment, unless factory mounted on the equipment, shall be installed under Division 26.

2.02 VARIABLE FREQUENCY DRIVES [S] [O/M]:

A. Variable Frequency Drives (VFD) shall convert primary power to adjustable voltage/frequency three phase AC power for stepless motor control from 5% to 105% of motor base speed. Units shall be pulse-width-modulation (PWM) type. Units shall be UL listed and suitable for installation in return air plenums, complete with Hand/Off/Auto switch, Run or Stop switch and display to indicate unit status, frequency and fault diagnostics. Unit shall have automatic soft restart after power outage, soft start/stop, and interface provisions for start/stop and control from the DDC system specified in Section 23 09 00 interconnections. Unit shall have all motor protective devices as required by NEC. Unit shall have line circuit breaker, bypass switch, motor thermal overload relay, phase-loss protection, ground-fault protection, harmonic compensated load side reactor and control transformer.

B. All drives provided for the project shall be supplied by the same manufacturer, including those installed with equipment at the factory. The VFD shop drawing shall be inclusive of all drives on the project.

C. Drives shall be suitable for operation without damage to the connected motor. Drives shall have multiple, adjustable deadbands across the entire speed range for operation of connected equipment without vibration. Units shall have display on each drive to indicate all faults and diagnostics.

D. Drives shall be matched to driven motors in accordance with motor and drive manufacturers' recommendations.

E. Drives shall be suitable for speed control by the DDC System specified in Section 23 09 00 using any of the following signals, 3-15 psi, 0-5 vdc, 0-10 vdc or 4-20 ma dc.

F. Drives shall be provided with current sensing device to indicate abnormal conditions such as broken belt.

G. Where wiring to the driven motor exceeds 150 feet or as otherwise recommended by the manufacturer, a load side drive filter shall be furnished and installed. Where drives have remote disconnects at the driven motor, a run contact shall be provided to stop the drive without harm if the remote disconnect is opened.

H. Drives shall be installed in NEMA classified cabinets suitable for the location in which installed. Units located outdoors shall be NEMA 3R or NEMA 4.

I. Harmonics: The drives provided shall not add significant voltage harmonic distortion to the electrical system. If voltage harmonic distortions exceed 5%, line reactors or isolation transformers shall be provided in a separate enclosure.

J. VFD shall be provided with communication interface to allow two-way communication with the DDC System specified in Section 23 09 00.

K. Warranty: Provide parts and labor warranty for a period of five (5) years.

L. Installation and Start-up:

1. The services of a qualified manufacturer's technical representative shall supervise the contractor's installation, testing, and start-up of all the drives furnished under this specification. A maximum total of one (1) supervision day (8 hours) shall be provided by the manufacturer's representative.
2. System start-up shall include a checkout of vibration at various frequencies through field observation and manufacturer's data on the driven equipment. Frequency deadbands shall be set-up for each point of equipment vibration.
3. Upon acceptance of the drive equipment, training of the operators shall consist of one (1) training day (8 hours).

2.03 EXPANSION FITTINGS FOR HVAC PIPING

A. (Expansion joints [S] shall be equal to Adsco RBJ Ram-Pak slip-type, single direction, 4" minimum traverse, 150 lb service, flanged ends, with base, suitable for steam or hot water service.)

B. Expansion joints [S] shall be Flexonic internally guided, corrugated bellows, expansion compensator, type H or HB, 2" minimum stroke, suitable for steam or hot water service. (Grooved pipe couplings and expansion compensators shall provide for expansion in grooved piping systems.) (Expansion joints may be used in lieu of pipe loops in hot or cold water recirculating systems.)

C. Anchors and guides for pipe shall be provided as indicated or as required at the job site to localize expansion and contraction of pipe. Anchors shall consist of heavy steel or brass collars bolted or welded to the pipe and rigidly connected to the building structure unless indicated otherwise. Anchor braces shall not be attached in places where they will damage or injure the structure during installation or by the weight or expansion force of the pipe line after installation. Detail drawings of pipe anchors shall be approved before anchor installation. (Where grooved piping system is used, follow grooved piping manufacturer's recommendations for anchors, guides and supports.)

D. Flexible pipe joints at chillers, pumps, air handling units or other pieces of equipment isolated from the structure by vibration isolators as specified elsewhere shall be pipe line size and shall be Flexonics standard 125 psi, Series PCS, stainless steel or bronze, flanged, screw or sweat type connectors with longitudinally welded stainless steel bellows and braided jacket.

2.04 METERS AND GAGES FOR HVAC PIPING

A. Thermometers ([S]) shall be 5" diameter adjustable angle, industrial type complete with stainless steel case, bezel, union (or 360° swivel) and stem, shatterproof lens, brass well, aluminum scale plate with black numbers and accurate to +1°F.

B. Pressure gauges ([S]) shall be equal to Ashcroft bourdon tube type suitable for 125 psi service. Gauges shall be not less than 4" dial type with aluminum case and bar stock needle type gauge cock. (Siphon shall be provided on steam gauges.) Gauges shall be graduated in feet of water and psi. Minimum range 1.5 times normal operating pressure.

2.05 GENERAL-DUTY VALVES FOR HVAC PIPING

A. General: Valves shall be Apollo, Bray, Center Line, Crane, Jenkins, Jamesbury, Nibco, Hays, Milwaukee, Stockham, Viega, (Victualic), or Weco. All valves shall be suitable for (150) (300) psi working pressure. Class 125 is not acceptable. Valves shall have threaded (or grooved) connections; except where flanges are specified they shall have fully lugged flanged connections suitable for dead-end service connections, and where installed in hard drawn copper lines they may have sweat connections. All valves shall be line size for the piping section indicated.

1. Equipment Service Valves over 4" ([S]): Valves shall be carbon steel or iron body fully lugged flanged high performance butterfly (HPBV) double offset type with 316 stainless steel disc and reinforced PTFE or RTFM replaceable seats, pressure assisted for tight shutoff. Butterfly valves shall provide bi-directional service, with downstream flange removed, and API 609 blow-out proof stem retention. Valves shall have upper and lower stem bearings of 316 stainless steel with PTFE seals.
2. Equipment Service Valves up to and including 2" ([S]): Valves shall be full port ball valves with stainless steel ball, 2-piece or 3-piece, brass body, bronze body, LF bronze body, or iron body, or shall be HPBV.
3. Equipment Service Valves 2-1/2" to 4" ([S]): Valves shall be full port ball valves with chromium plated brass ball, 2-piece or 3-piece, brass body, bronze body, LF bronze body, or iron body, or shall be HPBV.

4. Piping Branch Line Service Valves over 4" ([S]): Valves shall be iron body fully lugged flanged butterfly disc type with aluminum-bronze disc and EPT Nordel seats.
5. Piping Branch Line Service Valves up to and including 4" ([S]): Valves shall be full port ball valves, as specified for equipment service valves.
6. All valves for chilled water service shall have integral insulated handle equal to Nibco Nibseal. All valves for hot water service shall have stem extension for lever handle operator to accommodate up to 2" thick insulation.
7. Valves 4" and larger for steam service ([S]): Valves shall be fully lugged flanged HPBV type with carbon steel body and disc and reinforced PTFE seal ring.
    a. Operators for butterfly valves 6" and smaller shall be locking type manual lever with memory stop. Operators for butterfly valves 8" (VCU 4") and over shall be gear operator type with hand wheel, or chain wheel type as required for location where installed above 7 feet. Gear head shall have indicator to show disc position.
    b. Butterfly valves shall meet ANSI B16.34, B16.10, and B16.5, MSS-SP68, and API 609 standards.
    c. (Valves for steam and condensate return service up to and including 3" shall be forged steel, bolted bonnet.)
8. Globe valves ([S]) shall be all brass or bronze, with brass disc except globe valves over 2" size may be butterfly valves as specified above, under service valves. Non-rising stems are not acceptable.

B. Check valves ([S]) shall be brass or iron body, swing type, regrinding seat and shall be suitable for (125) (250) psi working pressure. (Check valves for condensate return service shall be forged steel body, swing type, regrinding seat and shall be suitable for 125 psi working pressure.)

C. Balancing cocks ([S]) shall be all brass or bronze, venturi type, plated ball valves with Teflon seats, Tee handles, memory stops, and temperature/pressure ports. All balancing cocks shall be suitable for positive shut-off at 125 psi working pressure.

D. Circuit setter [S] [O/M] shall be Bell & Gossett, Armstrong, or Taco. Those 2-1/2" and smaller shall be bronze, ball type or brass, globe type balancing valves. Valves 3" and larger shall be cast iron globe or ball type. All circuit setters shall have provisions for connecting a portable differential pressure meter. Meter connections shall have built-in check valves. An integral pointer shall register degree of valve opening. Each balance valve shall be constructed for 125 lbs. working pressure at 250°F. Furnish one differential meter model RO-2 complete with meter, cutoffs, piping, fitting and dual hoses. Circuit setters shall not be intended for use as shutoff valves. A circuit setter with memory stop is not a substitute for service valves.

E. Automatic Flow Control Valves [S] [O/M] shall be Griswold, Flow Design, Hays Fluid Controls, or Bell & Gossett and shall be provided at all (chilled water cooling coils) (and hot water heating coils). Valves shall be automatic pressure compensating type and factory set to provide specified flow rates within ten (10) percent regardless of system pressure. Valves shall be selected to provide specified flow rates with a minimum pressure differential of 2 psig. Where system differential exceeds 32 psig, valves shall be selected for a range of 4-57 psig. Valve body shall be suitable for use with piping system and internal working parts shall be stainless steel, nickel plated brass or elastomeric diaphragm. All valves shall be provided with union and pressure-temperature test ports suitable for connecting differential pressure measuring devices. All valves shall be wye configuration for removal of controlling element without removing valve from piping. Each valve shall be identified as to direction of flow and flow rate. Each valve shall be provided with strainer in piping upstream of the coil. Strainer shall be hose end blowdown valve as hereinafter specified. One differential pressure meter shall be provided complete with dual hose kit, valves, flow conversion chart and carrying case. Meter and accessories shall be turned over to the Owner upon final acceptance of the project. Valves shall be suitable for use with glycol/water configuration specified.

F. Triple Duty Valves [S]: Units shall be equal to Bell & Gossett straight pattern type for installation in vertical piping as indicated. Units shall provide functions of check valve, throttling valve, shut-off valve and calibrated valve with differential pressure ports. Valves shall be suitable for 125

psig and 250°F service. Valves shall be fitted with brass or bronze seat, replaceable bronze disc, stainless steel stem and spring. Valve rating shall not exceed 5 feet of water pressure drop at 100% flow and shall not exceed manufacturer's recommendations.

G. Thermostatic Radiator Valves ([S]) shall be equal to Danfoss series RA 2000 specifically for use with low pressure steam baseboard radiators. Valve shall be brass or bronze, straight type for horizontal mounting. Valve shall be rated for maximum 250°F and 15 psig steam pressure. Operator shall be tamper-resistant, valve mounted type with sensor and graduated dial.

H. Safety Valves [S]:
   1. Steam pressure relief valves for reducing stations shall be equal to Spirex-Sarco, bronze or cast iron body, manual test lever, suitable for steam service of sufficient capacity to relieve the full discharge capacity of the connected reducing valve. Discharge port of relief valves shall be pipe full size to 6" above roof and shall be supported so that no strain is on the valve. Valve shall be set to relieve at 5 psi above indicated operating pressure.
   2. Safety relief valves for water heating and cooling systems shall be equal to Watts ASME rated, series 740 or 174A. Valves for heating systems shall be sized to relieve the full heating capacity of the heater installed in the heating system at set pressure of 5 psi over operation pressure. Valves for cooling systems shall be 125 psi set pressure, 3/4" x 1" size. Pipe discharge port full size to floor and support so that no strain is on the valve body.

2.06 HANGERS AND SUPPORTS FOR HVAC DUCTWORK, PIPING AND EQUIPMENT

A. Suspended horizontal piping shall be supported by adjustable wrought steel clevis hangers except that straight runs of hot piping (>100°F) with 40 ft. or more between anchor and expansion device shall be supported on roller type hangers or supports. See Section 23 07 00 for calcium silicate hanger inserts at clevis hangers. All piping connected to motor driven reciprocating or rotating equipment shall have vibration isolation hangers as specified in Section 23 05 48. Protection saddle, welded to pipe, shall be provided at each roller support except on chilled water lines, saddle shall be external metal shield with calcium silicate preformed section as specified in Section 23 07 00, vapor sealed. Calcium silicate inserts may be omitted for pipe smaller than 2 inches. Where supports bear on copper pipe they shall be copper plated. Chain, strap or other makeshift devices will not be permitted as hangers of supports.

B. Maximum pipe support spacing for steel piping shall be ten feet on center, -copper and brass tubing 1-1/4" and smaller shall be supported six feet on center (except where grooved couplings are used, no pipe length shall be left unsupported between any two grooved couplings). (Galvanized steel angles or channels shall be provided 10 feet on center across top of tunnels for support of pipes as indicated.)

C. Vertical steel piping shall be guided or supported in the center of each riser and not over 15 feet on center, copper or brass tubing shall be supported at not over 10 feet on center; and supported at the base of each riser and/or at the top of each riser as required by the piping run. All vertical piping shall be guided or braced where required to prevent lateral movement. Bracing shall include auxiliary stanchions where piping is not in close proximity to suitable structure. (Where grooved couplings are used, guides shall be placed on every other pipe length.)

D. Refrigerant piping smaller than 3/4" shall be supported using B-Line Armafix clamps by Cooper Industries or equal.

E. Rigid support sway bracing shall be provided at changes in direction greater than 45 degrees for all pipe 4 inches and larger.

F. Pipe and suspended equipment hanger rods shall be attached to the top chord only on steel joists and beams by joist or beam clamps without welding. Welding of support rods and connection at any place other than the top chord will not be permitted unless written approval is granted by the Engineer and the Architect. C-clamp hangers shall be limited to 50 lb. or less

when used at joists. Threaded rod shall be used through joist chords for loads greater than 50 lb.

G. Pipe and suspended equipment supported from concrete structure shall be high-strength screw anchor and threaded rod system. Anchor shall be zinc plated, heat treated, carbon steel with integral flanged head to accept threaded rod. Anchor shall be selected to provide a minimum safety factor of 2 for the load to be supported and shall be approved for use in cracked and uncracked concrete applications. Anchor shall be Simpson Strong-Tie Titen HD or equal.

H. Duct supports shall consist of not less than 1" by 1/16" galvanized strap iron hangers spaced not over 4 feet on center, except medium and high pressure flat-oval ducts wider than 48 inches shall be supported by trapeze angles. Straps shall be lapped across the bottom ducts a minimum of 1 inch. Ductwork shall be supported from the building structure. Ductwork shall not be supported from the ceiling system or any other building services. Heavy ductwork such as medium or high pressure duct supported by hanger rods, shall be attached to the top chord only on steel joists and beams by joist or beam clamps without welding. Welding of support rods and connection at any place other than the top chord will not be permitted unless written approval is granted by the Engineer and the Architect. All ductwork shall be braced as required to prevent lateral movement.

I. Roof mounted (piping and) duct supports shall be factory fabricated mounting pedestals as manufactured by Roof Products and Systems, Inc. (RPS) or equal. Pedestals shall be minimum 12 inches high, complete with equipment rail, slide channel "U" shaped mounting brackets, 18 gauge threaded galvanized rods, lateral spacer bracket and galvanized slide assembly. Supports shall be located to adequately support duct with no more than 4 feet of duct unsupported. (Piping shall be secured to supports using accessories furnished by the support manufacturer.)

J. Where piping is to be installed on an existing roof, pipe supports shall be pre-manufactured rubber pedestal supports, manufactured specifically for mounting on top of existing roofing systems. Pedestals shall be minimum 2.5 inches high complete with galvanized steel slide channel attached to the base. Two ½ inch diameter threaded rods 10 inches in length shall attach a galvanized steel slide channel to the base channel with the pipe being secured by a rigid steel pipe clamp. The support height shall be adjustable to accommodating a sloping pipe. Rooftop support shall be equal to RTSPUCES Rooftop Support Systems manufactured by Eberl Iron Works, Inc.

K. (See Section 23 00 10 for special support requirements for Wooden Structure. Connection at any location other than those specified will not be permitted unless written approval is granted by the Engineer and the Architect. Drilling or cutting of wooden trusses shall not be permitted.) (See Section 23 00 10 for special support requirements for Pre-manufactured Light Gauge Metal Structure. Welding and connection at any location other than those specified will not be permitted unless written approval is granted by the Engineer and the Architect.)

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's recommendations.

B. Support riser piping independently from the connected horizontal piping.

C. Hangers shall be spaced so that the supported load does not exceed the load recommended by the manufacturer. The supported load shall not overstress the building structural members. Where required hangers for the suspension of heavy items do not correspond with the building structural members, provide supplemental steel members fastened to the building structural members.

D. Valves in horizontal lines shall be installed with stems horizontal or above. Flanged butterfly valves shall be provided with spacer or spool piece between valve and adjacent appurtenance.

Isolation service valves shall be installed on each side of each major piece of equipment such as a (pump,) (converter,) (cooling tower,) (boiler,) (chiller,) (condenser,) (heating coil,) (cooling coil,) and other similar items; and at any other points indicated or required for draining, isolation or sectionalizing purposes. Control valves shall be installed in accordance with control manufacturer's recommendations. (Radiator valve shall be provided on each convector or radiator.)

E. Install all thermometers and gages such that they can be easily readable standing on floor. Gages subject to vibration or physical damage shall be adequately supported and protected.

F. Where pressure/temperature ports are indicated on the drawings, they shall be provided with full port gauge cocks that allow penetration of instrument probes.

G. All outdoor water piping that does not contain glycol shall be provided with heat trace under insulation. All accessories shall be provided as necessary for a complete operating system.

H. (Where grooved piping is used, the Contractor shall provide appropriate means of accommodating thermal expansion in accordance with the manufacturer's recommendations.)

I. Butterfly valves in horizontal lines shall be installed with the stem horizontal.

END OF SECTION

SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Vibration Isolators
2. Inertia Bases
3. (Seismic Restraints) ***SEE IBC SECTION 1600 AND ASCE-7 FOR REQUIREMENTS

C. Related Sections:

1. Section 23 00 10 – HVAC General Requirements
2. Section 23 20 00 – HVAC Piping and Pumps
3. Section 23 30 00 – HVAC Air Distribution
4. Section 23 80 00 – Decentralized HVAC Equipment
5. Division 26 - Electrical

1.02 QUALITY ASSURANCE

A. All vibration control apparatus shall be supplied by a single recognized manufacturer. The supplier of noise and vibration control equipment shall supervise, inspect and approve the installation of their equipment. The supplier shall submit a letter to the Engineer at the conclusion of the project stating that all items have been installed properly and that all equipment is adequately isolated.

1.03 SHOP DRAWINGS

A. Submit shop drawings and product data in accordance with Division 1.

B. Shop drawings, cuts, diagrams, catalog data sheets or such other data necessary to fully describe and substantiate compliance with the specifications shall be submitted for all (seismic restraints,) vibration isolation equipment and materials. The Contractor shall submit drawings for review stating the static deflection, load capacity and location of the isolators, inertia slab dimensions and installation instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Kinetics Noise Control, Vibration Mountings and Control, Inc., Vibration Eliminator Co., Mason Industries, Vibro-Acoustics or Amber/Booth Company.

B. Model numbers used in this specification are those of Kinetics Noise Control and are included to establish a standard of quality.

2.02 SEISMIC RESTRAINTS [S]

A. All Division 23 systems, components and their attachments shall be designed and constructed to resist vibrations resulting from emergency storm shelter conditions. Shop drawings shall detail each type of restraint and shall include all supporting calculations. Restraints shall include, but not be limited to, snubbers, sway bracing and anchors.)

2.03 ISOLATOR TYPES

A. Floor Mounted Equipment:

1. Type S spring vibration isolators shall be free-standing, unhoused, laterally stabile, steel springs, wound using high strength heat treated spring alloy steel, and shall have a horizontal spring stiffness equal to or greater than 1.0 times the rated vertical spring stiffness. Springs shall be selected to provide the tabulated minimum operating static deflections and shall provide a 50% overload capacity before reaching a solid state. Springs shall be designed to reach a solid state before exceeding the spring steel fatigue point. Springs used to isolate floor mounted equipment shall include a drilled and tapped steel top load plate, and a steel bottom load plate bonded to a 1/4" thick ribbed neoprene noise stop pad. Each spring mount shall include a steel leveling bolt, locknuts, and washers for attachment to supported equipment. Type S units shall be Kinetics Model FDS. Springs shall have the following minimum outside diameters:

Spring Deflection,	Rated Capacities, Lbs.		
Inches	Up to 370	371 to 1600	1601 to 11000
Up to 1.5	1.75" dia.	3.00" dia.	3.00" dia.
1.51 to 2.25	3.50"	5.0"	5.0"

2. Type 3, vertically restrained, spring mounts shall incorporate a single spring vibration isolator having all of the characteristics of Type S spring isolators as previously specified in a steel mount assembly designed to limit vertical movement of isolated equipment. If equipment loads are reduced or equipment is subject to external loads, vertical movement shall be limited without degrading the vibration isolation of the spring element during normal equipment operating conditions. The mounts shall have a flat steel top load plate, for welding to supporting equipment, vertically restrained by noise isolated bolts, connected to steel channel and drilled plated assemblies welded to a steel base plate. The base plate shall be bonded to a 1/4" thick ribbed neoprene noise stop pad and drilled for bolting to supporting structures. Type 3 units shall be Kinetics FLS.
3. Type 1 fiberglass isolators shall be precompressed molded fiberglass noise and vibration isolation pads, individually coated with a flexible moisture impervious elastomeric membrane. The fiberglass pads shall have been stabilized by ten (10) compression cycles to three (3) times the maximum published load. Load range and natural frequency shall be as recommended by the isolator manufacturer for each specific application. But, in no case shall a natural frequency higher than 12 Hz be provided for applications intended to isolate sound, nor higher than 15Hz for applications intended to isolate impact noise and shock. Type 1 units shall be Kinetics Model KIP.
4. Type N neoprene isolation mounts shall incorporate a cast-in tapped steel load plate, to permit bolting to supported equipment. The neoprene pad shall be molded using 2500 psi tensile strength, oil resistant compounds, and shall have no color additives in the compound. The neoprene isolator shall be selected to achieve the minimum operating static deflection tabulated, while not exceeding the published load capacity for the isolator used. Each neoprene isolation mount shall be externally color coded to identify load capacity, and shall incorporate a cast-in drilled steel anchor/base plate. Type N units shall be Kinetics Model RD.
5. Type NIP neoprene isolation pads shall be single rib or crossed, double rib neoprene in shear pads in combination with steel shims. Neoprene pads shall be molded using 2500 psi tensile strength, oil resistant compounds. Type NIP units shall be Kinetics Model NPS, NPD, NGS, or NGD.

B. Suspended Equipment:
1. Type 2 hangers shall consist of a steel spring and a elastomer-in-shear isolator placed in series and encased in a welded steel bracket. The spring element of the hangers shall meet all specified characteristics of a "Type S" spring as previously specified. Springs shall be color coded for ease of load capacity identification and removable for field correction of overloaded hangers. The elastomer noise stop pad shall be selected to operate within the published load range for the pad for each spring capacity when placed in the bracket used. The hanger bracket shall be designed to carry five (5) times overload without failure, and

shall allow up to 15° rod misalignment without metal to metal contact. Type 2 units shall be Kinetics Model SRH.

2. Type F hangers shall consist of an elastomer-in-shear isolator encased in a welded steel bracket. The elastomer shall be bonded to the hanger bracket and shall be selected to support the load within its published load rating. The hanger bracket shall be designed to carry a five (5) times overload without failure and allow up to 15° rod misalignment without short circuiting. Type F hanger shall be Kinetics Model RH.

2.04 BASE TYPES

A. Type 7 inertia bases shall consist of a concrete slab, cast into a prefabricated inertia base frame assembly designed and supplied by the isolation materials manufacturer. Frames shall be welded steel channel with a depth greater than 8% of the longest dimension, a minimum of 6" thick, and shall include welded-in 1/2" steel reinforcing rods on 8" centers each way. Prelocated equipment anchor bolts shall be fixed into position, and housed in steel bolt sleeves allowing minor bolt location adjustment. Isolator support brackets, when required, shall be welded into the corners of perimeter channel frames with 1/2" reinforcing rods 1-1/2" above bottom of brackets running continuous in two directions between isolator brackets. Where bases are used under pumps, the base shall be large enough to support riser elbows. Type 7 bases shall be Kinetics Model CIB-L or CIB-H.

B. Type B equipment bases shall consist of structural support members, with welded on isolator support brackets, and prelocated and drilled anchor bolt holes, designed and supplied by the isolation materials manufacturer. The structural steel bases shall have beams of minimum section depth equal to 8% of the longest span between support isolators, a minimum of 6", and shall be of sizes and shapes required for equipment to be supported. Isolator support brackets shall be welded to the structural beam base as required to provide the lowest possible mounting height of supported equipment. Anchor bolt holes shall be prelocated and drilled into all equipment bases to bolt down equipment. The structural steel bases shall provide a rigid, distortion free mounting base for supporting equipment, which allows no excessive differential motion between driven equipment components. Type B bases shall be Kinetics Model SFB or SBB.

C. Type 8 bases shall be prefabricated extruded aluminum rail system using 1" deflection Type S free standing stabile springs and a continuous elastomeric air and water seal. All metal parts shall be non-corrosive or zinc plated. Each rail system shall be designed and sized specifically to fit the roof curb and the equipment proposed to receive the isolation rails. The upper portion of the equipment rail shall be designed to continuously support the weight of the equipment provided. Springs shall be spaced to provide a uniform 1" static deflection when equipment is mounted on the isolation rails. All rail sections shall be designed and arranged to shed water outward and shall be watertight. Type 8 bases shall be Kinetics Model KSR.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment: All equipment listed hereinafter shall be isolated from the structure and fixed parts by means of resilient vibration and noise isolators. Isolators for floor and roof mounted equipment shall be solidly anchored to the support base or floor and to the supported equipment unless indicated otherwise.

B. Piping and Conduit: All piping and electrical conduit connected to the chillers (including refrigerant piping), pumps, air handling units, or other pieces of moving equipment which are isolated from the structure by spring type vibration isolators shall be isolated from these units by flexible pipe connectors and shall be suspended on isolation hangers to a point 10 feet away. Use Type 2 hangers for suspended piping, Type S mounts for floor mounted piping. Flexible pipe connectors are specified as part of the piping work.

C. Ductwork: Flexible connections shall be incorporated in the ductwork adjacent to all air moving units as part of the sheet metal work. Ductwork shall be suspended on Type F hangers for a distance of (10) (20) (30) feet from these units (, except isolators shall not be required beyond wall surrounding the equipment room).

3.02 EQUIPMENT WITH INTERNAL ISOLATION

A. Where air handling units have fan and motor assembly internally isolated from the unit casing, using both spring isolators and flexible fan discharge connections, external isolators for the air handling unit shall not be provided.

END OF SECTION

SECTION 23 0553

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Prepare and paint Division 23 accessories, ductwork, piping and miscellaneous materials located in Equipment Rooms, Boiler Rooms, pipe trenches and other utility areas housing mechanical equipment and materials.
2. Prepare and paint Division 23 accessories, ductwork, piping, and miscellaneous materials exposed to view (including behind acoustic baffles, etc.). Color and finish shall be per Architects Finish Schedule or as selected by Architect during construction.
3. Identification of piping in exposed and accessible locations.
4. Marking and designation of equipment.

C. Work Not Included:

1. Painting of ductwork, piping or equipment located on the building exterior.
2. Painting of ductwork, piping or equipment exposed in finished areas other than those listed under WORK INCLUDED above.
3. (Painting of existing equipment, piping or ductwork.)

D. Related Sections:

1. Section 09 90 00 – Painting and Coating
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 07 00 – HVAC Insulation
5. Section 23 09 00 – Instrumentation and Control for HVAC
6. Section 23 20 00 – HVAC Piping and Pumps
7. Section 23 30 00 – HVAC Air Distribution
8. Section 23 80 00 – Decentralized HVAC Equipment
9. Division 26 - Electrical

1.02 REFERENCED STANDARDS:

A. General: The following standards or codes (latest edition) form a part of this specification to the extent indicated by the reference thereto.

B. American National Standards Institute (ANSI):

1. ANSI A13.1 Scheme for Identification of Piping Systems

C. American Society for Testing and Materials (ASTM):

1. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM C 411 Standard Test Method for Hot-Surface Performance of High-Temperature

D. National Fire Protection Association (NFPA):

1. Standard 255 Method of Test of Surface Burning Characteristics of Building Materials

E. Underwriters Laboratories, Inc. (UL)

1. Standard 723 Tests for Surface Burning Characteristics of Building Materials

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Except as otherwise specified, materials shall be the products of the following manufacturers:
   1. Sherwin-Williams
   2. Pratt and Lambert
   3. Pittsburgh Paints (PPG)
   4. Benjamin Moore
   5. Porter Paints
   6. Seton Identification Products

2.02 MATERIALS:

A. Deliver all paints and materials to the project site in their unopened original containers with all labels intact and legible at the time of use.

B. All coatings exposed to supply and return airstreams and where applied to exposed surfaces in a return air plenum, shall have a composite flame spread rating not exceeding 25, and a smoke developed rating not exceeding 50 as tested under procedure ASTM E-84 (latest) and UL 723 (latest). Coatings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411, latest edition.

C. Sherwin-Williams Industrial Maintenance Coatings System 4000 products are listed below to establish color and a standard of quality.
   1. All Hangers and Supports: One coat Series 54 Gloss Black Alkyd Enamel.
   2. Ducts:
      a. Interior duct behind all grilles, registers and diffusers shall be painted with one coat of flat black prime or flat black finish paint.
      b. Exposed in equipment rooms and other unfinished areas such as storage areas and utility type spaces; uninsulated galvanized steel ducts shall be chemically prepared and primed with one coat of Galvite B50W3 Primer. Aluminum ducts and insulated ducts with aluminum jacket shall be primed with one coat of No. B50Y1 Zinc Chromate Primer. Canvas or paper insulation jacket shall be primed with one coat of No. B28W200 Wall Primer. Finish with Series 54 Alkyd Gloss Enamel, gray No. SW4028 Gypsum applied in sufficient number of coats to effectively cover the prime coat.
   3. Piping: Exposed in equipment rooms and where connections are made to equipment located in storage rooms and other utility type areas.
      a. Priming:
         1) Insulation Canvas or Paper Jacket: One coat No. B28W200 Wall Primer.
         2) Insulation Aluminum Jacket: One coat No. B50Y1 Zinc Chromate Primer.
         3) Bare Iron or Steel or Copper: One coat No. B50Y1 Zinc Chromate Primer.
         4) Galvanized Steel: Pipes and ductwork shall be chemically prepared and primed with one coat of Galvite B50W3 Primer.
         5) Asphalt Coated Pipe: One coat No. B28W200 Wall Primer.
      b. Finish: All pipe lines and the supports or hangers therefore, shall be finished with Series 54 Alkyd Gloss Enamel, gray No. SW4028 Gypsum applied in sufficient number of coats to effectively cover the prime coat. Painting of pipe hangers is specified hereinbefore.
      c. Materials shall be as recommended by the manufacturer for the surface to be finished.
      d. Unless otherwise specified, primer shall be by the same manufacturer as the finish coat.
      e. Materials shall not be thinned or cut except as recommended by the coating manufacturer. Thinners shall be by the same manufacturer as the primer and finish coat.

D. Valve tags ([S]) shall be neat circular brass with designations stamped thereon, attached with solid brass jack chain to each valve stem or handle.

E. Each item of equipment such as pumps, air handlers, etc., and equipment control devices such as motor starters, disconnect switches, etc. shall be properly marked with laminated engraved plastic nameplates ([S]) fastened with sheet metal screws, bolts or permanent adhesive. Pressure sensitive tape is not acceptable.

F. All piping, insulated and uninsulated, shall be identified ([S]) with Seton Setmark or equal wrap around piping system markers and arrow flow directional marker. Markers shall be pre-coiled, semi-rigid plenum-rated plastic or polyester with sealed color graphics. Markers shall be minimum 12 inches long with 1-¼ inch high letters, formed to cover entire circumference of the pipe. Markers shall be attached to piping using plenum-rated plastic tie wraps. Pipe identification shall use the same designations or abbreviations used on the drawings. Marker colors shall be in accordance with ANSI.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

A. The work shall be accomplished by qualified mechanics skilled in the painting trade. Painting of equipment, piping, ductwork and other materials shall not commence until all testing is complete and systems are ready for operation. Materials shall be applied according to manufacturer's directions. All containers shall be securely closed when not in use. Flammable materials shall not be stored on premises. Flammable waste shall be disposed of daily in devices approved for such purposes. Materials shall be evenly spread, and smoothly flowed on without runs or sags. Each coat shall be thoroughly dry before application of succeeding coats.

3.02 PROTECTION OF WORK:

A. The painters shall protect all adjacent surfaces with drop covers during the process of painting. Upon completion, paint spots, if any, shall be removed from all surfaces.

3.03 PREPARATION OF SURFACE:

A. Surfaces to be painted shall be completely dry before applying paint. Metal surfaces shall be cleaned with mineral spirits before applying materials. Rust and scale shall be removed by wire brushing or sanding. Galvanized surfaces shall be chemically pretreated with crystalline (zinc phosphate) phosphate in strict accordance with the manufacturer's recommendations. Surfaces shall not be painted when the temperature is, or is likely to be, near the freezing point, nor when they are exposed to hot sun.

B. IDENTIFICATION OF PIPES AND EQUIPMENT:

C. Equipment: After all other painting is completed, each piece of equipment shall be properly identified with nameplates. Identification symbols and designations shall be the same as shown on the Contract Documents. Where equipment is installed above lay-in ceilings (VAV boxes, cabinet unit heaters, fan coil units, dampers, or similar), an additional plastic nameplate shall be adhered to the face of the T-bar support so that it can be identified from within the space.

D. Apply piping system markers after completion of required insulation and finishes on piping systems. Markers shall be applied in the following locations and where identified by the Engineer:

1. At each valve and at connection to equipment.
2. At every tee and branch connection.
3. At each riser including branch risers from mains.
4. At each side of a pipe passage through floors, walls and partitions.
5. Every 15 feet on straight runs of piping mains and branches.
6. Within 6 feet of elbows (each side).
7. At access doors or similar points that permit view of concealed piping.
8. Markers shall be provided on all piping above lay-in ceilings.

9. Provide arrow markers showing direction of flow incorporated into, or adjacent to, each piping system marker.
10. Apply all piping system markers where view is unobstructed, and legends can be read and easily identified.
11. Apply all tags and piping system markers in accordance with the supplier's instructions.
12. The termination of concealed condensate piping shall be marked to indicate whether the piping is connected to the primary or secondary drain.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Cleaning
2. Adjusting and Balancing

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 07 00 – HVAC Insulation
5. Section 23 09 00 – Instrumentation and Control for HVAC
6. Section 23 20 00 – HVAC Piping and Pumps
7. Section 23 30 00 – HVAC Air Distribution
8. Section 23 80 00 – Decentralized HVAC Equipment

1.02 REFERENCES

A. General: The following publications listed below, form a part of this specification to the extent indicated by the reference thereto.

B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):

C. Balancing and Adjustment Manual

D. Associated Air Balancing Council (AABC):

E. National Standards for Total System Balance

F. National Environmental Balancing Bureau (NEBB):

G. Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.03 QUALIFICATIONS

A. For the air conditioning, heating and ventilation systems the Contractor shall obtain the services of a qualified, independent testing organization specializing in total system air and water testing and balancing. The Contractor shall be responsible for making changes in pulleys, belts and dampers where necessary to obtain the required air volume as determined by the Testing and Balancing Contractor. The Testing and Balancing Contractor shall provide all labor, engineering and test equipment required to adjust, test and balance all heating, ventilating, air conditioning and exhaust systems as hereinafter specified. All personnel involved in the execution of the work under the balancing contract shall be experienced and factory trained specifically in the total balancing of mechanical systems, as well as being regular employees of the Balancing Contractor. The Test and Balance Contractor shall work in close coordination with the Controls Contractor to ensure that the system is operating as designed and to aid in adjusting setpoints as necessary for proper system operation.

B. (For the air conditioning, heating and ventilation systems the Contractor shall provide all services for total system air and water testing and balancing. The Contractor shall be responsible for making changes in pulleys, belts and dampers where necessary to obtain the required air volume. The Contractor shall provide all labor, engineering and test equipment required to adjust, test and balance all heating, ventilating, air conditioning and exhaust systems

as hereinafter specified. All personnel involved in the work shall be experienced and trained specifically in the total balancing of mechanical systems.)

1.04 TAB COORDINATION AND RESPONSIBILITIES

A. The TAB Agent shall provide the following:
   1. All instrumentation used in the course of testing and balancing shall be accurate and shall have been calibrated within the six months prior to commencing test and balance work for this project.
   2. (Where existing air or hydronic systems are to be renovated, the TAB Contractor shall provide a complete measurement of air and water flow for systems indicated to remain prior to any construction or demolition of existing systems. For air systems, the data shall be taken and recorded for each piece of air handling equipment serving the area of renovation and those indicated on the drawings for ductwork or other mechanical renovations. Data shall be provided as outlined for balancing data hereinafter. For hydronic systems, pump flow data for each system shall be provided as well as flow to each terminal device being modified, replaced, or removed. Any discrepancies in the data shall be reported to the Architect/Engineer prior to commencing any mechanical work.)
   3. The TAB Agent shall conduct a pre-TAB inspection two weeks prior to commencing the test and balance. The TAB Agent shall notify the Contractor in writing of any deficiencies that would affect the ability to successfully complete the test and balance or result in an incomplete or unacceptable report.
   4. During the course of the test and balance, the TAB Agent shall immediately notify the Contractor of any equipment or system discrepancies discovered that need to be corrected prior to the satisfactory completion of the test and balance procedures.
   5. Equipment settings, including damper positions, valve positions, fan speed controls, and similar devices shall be marked to show final settings.

B. The Contractor shall provide the following:
   1. Prior to the commencement of testing and balancing, the installation of building systems shall be fully complete. Building controls systems shall be complete, operational, and verified by the Contractor.
   2. The Contractor shall resolve any discrepancies noted by the TAB Agent in the Pre-TAB Inspection prior to commencing the test and balance. The Contractor shall provide written confirmation of the corrective action that was taken to correct each deficiency.
   3. The Contractor shall make available qualified personnel during the period in which the test and balance is being conducted for the purpose of problem resolution and controls support.
   4. The Contractor shall resolve any deficiencies noted by the TAB Agent prior to the submission of the report and prior to any subsequent visits required by the TAB Agent.

1.05 SUBMITTALS

A. Prior to commencing work under this section, the Contractor shall submit the name of the testing organization, a proof of certification by the Associated Air Balance Council or National Environmental Balancing Bureau, and a list of five local projects on which testing and balancing has been completed for two years, for approval by the Architect/Engineer. The submittal shall include TAB procedures proposed for the systems specific to this project.

B. Contract Documents Examination Report: Within 90 days from Contractor's Notice to Proceed, based on examination of the Contract Documents as specified in the "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices. As part of the submittal, the Contractor shall provide a list of any conditions where balancing or testing cannot be accomplished due to access or other project conditions.

C. Heating, Air Conditioning and Ventilation Systems Balance and Performance Data: At a time no later than the Substantial Completion Inspection, the Contractor shall provide the

Architect/Engineer with two (2) typewritten copies of schedules containing air and water system balance and performance data.

D. Equipment and System Verification: Letters, signed by representatives of boiler, chiller, cooling tower, heat pump, air conditioning unit, and temperature control manufacturers, shall attest that their respective equipment installed on this project has been started, tested and set to operate safely and at the control points required as an integral part of the systems specified herein. The Contractor shall attest by letter that all equipment has been wired and tested to see that the indicated sequence of motor control is established, that all safety controls function properly, that all motor protective devices are sized correctly and that the systems are operating at the points set on the controls. The Engineers will not conduct a site visit for the purpose of determining the status of final payment until these letters are received.

E. Test data shall be submitted for all equipment and systems where specifically required by this specification and all items identified with [TD] behind the product data.

1.06 COMMISSIONING OF HVAC SYSTEMS

A. Participate in Commissioning Meetings designated by the Commissioning Agent.

B. Participate in resolving controls issues identified by the Commissioning Agent.

C. Notify Commissioning Agent a minimum of 2 weeks in advance of start-up of Testing, Adjusting and Balancing (TAB) work. Arrange and attend meeting between Commissioning Agent and TAB agency for review of TAB procedures, TAB work plan, and TAB schedule. Refer to Division 1 for complete scope of Commissioning work.

D. Provide Commissioning Agent with a copy of preliminary and final balance reports.

1.07 CONDITIONS

A. Partial Testing: As much as practical, systems shall be tested as complete systems. Tests on portions of a system will be permitted to facilitate proper progress scheduling. When systems are tested in segments, a system diagram indicating portion tested and a separate and complete report including the date of test is required for each segment.

B. Concealed Work:

1. All concealed work shall be tested and approved by the Architect/Engineer prior to the application of insulation or construction of chase walls.
2. Covering shall not be applied to any piping nor shall any piping be concealed or covered until pipes have been tested, all leaks stopped, retested and approved.
3. Where ductwork is inside a shaft or chase, TAB agent shall coordinate with Contractor to make the required traverses before shaft walls are closed in, or shall make provisions to allow for traverse to be done at a later date through fire rated (where required) access door of adequate size for full traverse.

C. (Work in Existing Buildings: Where new piping systems are connected to existing systems, test the new system prior to making connections to existing system. Connections to existing systems are not to be tested unless required by local authorities.)

PART 2 - PRODUCTS

2.01 GENERAL

A. All equipment, instruments, materials and utilities required for cleaning, testing and balancing of the air and hydronic systems shall be provided by the Contractor.

2.02 INSTRUMENTATION

A. All instruments used by this Contractor shall be accurately calibrated and maintained in good working condition.

2.03 TESTS OF MATERIALS

A. Manufacturers' certificates will be accepted in lieu of tests of materials. If individual laboratory tests are desired by the Architect-Engineer, they will be secured by this Contractor and paid for by the Owner.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to identify conditions in the design that may preclude proper TAB of systems and equipment.
   1. Contract Documents are defined in the General Conditions and Supplementary Conditions.
   2. Verify that balancing devices required for proper TAB are indicated in the Contract Documents, including, but not limited to, test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers.
   3. Verify that the quantity, location, and accessibility of balancing devices are adequate for effective balancing and for efficient operation of systems and equipment.

B. Examine approved submittals for HVAC systems and equipment before beginning TAB. Where approved submittals differ from the Contract Documents, include changes to capacities, flow rates, pressure drops, quantities, and other pertinent performance data in the TAB plan. Where approved by the Engineer, use approved submittal data as the basis for TAB.

C. Examine design data, including HVAC system descriptions, stated design assumptions, sequences of operation, control diagrams, and control philosophies. Identify discrepancies, omissions, and conditions that may affect the ability to perform accurate TAB.

D. Examine equipment performance data, including fan curves and pump curves, and relate the data to Project conditions and installed system configurations. Identify conditions that may cause system effects or otherwise reduce equipment performance below scheduled or submitted values. For air systems, evaluate apparent system-effect conditions using AMCA 201, Fans and Systems, Sections 7 through 10, or SMACNA's HVAC Systems--Duct Design, Sections 5 and 6. Report discrepancies, concerns, and observations in the Contract Documents Examination Report.

E. Examine system and equipment installations to verify that they are complete and that specified cleaning, testing, startup, and commissioning activities required for TAB have been performed. Do not begin TAB procedures on systems that are incomplete or not ready for operation, except to document deficiencies. TAB work performed before systems are complete, operational, and ready for TAB, or before identified deficiencies are corrected, is preliminary only and shall not constitute final TAB or be grounds for accepting TAB work as complete.

F. Examine available system and equipment startup reports, factory test reports, and field test reports affecting TAB work.

G. Examine HVAC system and equipment installations to verify that balancing devices are installed where indicated, are accessible, and are suitable for effective TAB. Report deficiencies in Deficiency Reports.

H. Examine the Project for required makeup air paths and transfer openings that directly affect exhaust system performance, including transfer grilles, door undercuts, and similar provisions serving closets, toilet rooms, and equipment rooms.

I. Examine systems for functional deficiencies that cannot be corrected through TAB procedures or that will impair, prevent, or delay accurate TAB. Promptly notify Contractor and Engineer of deficiencies observed before and during TAB procedures. Report deficiencies in Deficiency Reports. Deficiencies include, but are not limited to, the following:
   1. Incorrect location or orientation of control valves.
   2. Three-way valves installed incorrectly for intended mixing or diverting service.

3. Incorrect control valve size or Cv.
4. Circulating pumps installed in reverse.
5. Heating-water and chilled-water coils installed in the wrong location or orientation.
6. Heating-water and chilled-water coils piped incorrectly, including reversed supply and return connections or incorrect service to the coil.
7. Missing or inaccessible pressure ports.
8. Missing or inaccessible circuit setters or balancing valves.
9. Missing diffusers or return-air grilles.
10. Missing or inaccessible balancing dampers.
11. Missing transfer openings or air pathways.
12. Sheet metal ductwork or flexible ductwork installed in a manner that restricts airflow.

J. Examine HVAC equipment to verify that clean filters are installed, bearings are lubricated as required, belts are aligned and properly tensioned, and controls are installed and functional so that equipment is ready for operation.

K. Examine terminal units, including VAV units, to verify accessibility and proper installation and operation of controls. Report deficiencies in Deficiency Reports.

L. Examine plenums used for supply air to verify that they are adequately sealed and that penetrations and openings are sealed.

M. Examine strainers to verify that screens are clean and perforations are proper for the intended service.

N. Examine heat-transfer coils for proper piping arrangement and for clean, undamaged fins. Verify correct flow direction. Report deficiencies in Deficiency Reports.

O. Examine pump suction piping to verify that entrained air is not present.

P. Examine equipment to verify proper installation and operation of safety interlocks and controls.

Q. Examine automatic temperature-control system components affecting TAB to verify the following:
1. Dampers, valves, and other controlled devices are operated by the intended controller.
2. Dampers and valves are positioned consistent with controller commands.
3. Dampers and valves operate freely through the full required stroke and provide the intended shutoff or failsafe position.
4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected, oriented, and accessible for service.
5. Thermostats and humidistats are located to avoid adverse influence from sunlight, drafts, and cold surfaces.
6. Sensors are located to sense only the intended conditions.
7. Interlocked systems operate as intended.
8. Adverse temperature or airflow conditions attributable to controls are identified and reported.

3.02 CLEANING

A. Each boiler shall be cleaned in accordance with manufacturer’s instructions before being connected to the system.

B. Equipment shall be wiped clean to remove all dust, oil, dirt or paint spots. Trash, plaster, mortar or paint shall be removed from all coils, plenums and end pockets.

C. Heating Piping, Cooling Piping and Ductwork shall be thoroughly blown out or flushed and cleaned of all foreign matter before connections are made to equipment. Temporary bypasses shall be provided around coils, control valves, ice tanks, heat exchangers and other similar items to prevent trash from being flushed into these items. Care shall be taken at time of installation to prevent pipe compound, scale or other objectionable matter from entering the piping systems. Strainers shall be cleaned. After all construction dirt has been removed from the building, new filters shall be installed in all air units.

3.03 ADJUSTING AND BALANCING:

A. Equipment: Before attempting to adjust and balance the air and water systems, the Contractor shall verify that the following items have been completed and are correct.
   1. Motor and bearings are properly lubricated.
   2. Direction of rotation of motors.
   3. Belt tension.
   4. Electric current flow in each phase of motors and electric heating elements.
   5. Motor protective devices are sized to properly protect installed motors.
   6. Thermostats, controls, accessories and other items requiring setting or adjustment shall be set as indicated.

B. Air System Balancing Procedure:
   1. Place all related supply, exhaust and return air systems in operation with the fans running at design RPM.
   2. Establish system conditions for the maximum demand in airflow; generally, a cooling application. Variable volume systems shall be set and balanced such that the systems are operating at minimum static pressure necessary to maintain proper airflow at the terminal devices.
   3. Measure supply air volumes by means of the duct traverse method, making a minimum of sixteen (16) readings. Test holes shall be in straight duct as far as possible downstream from elbows, takeoffs, dampers, etc. Seal duct access holes with metal snap-in plugs. The use of duct tape to seal access holes will not be permitted.
   4. Adjust balancing dampers for required branch duct air quantities. Ducts with multiple branches shall have at least one branch with volume damper(s) completely open.
   5. Adjust grilles and diffusers to within deviations listed below of individual requirements specified, and also adjust so as to minimize drafts and sound in all areas. Restriction imposed by flow regulating devices in or at terminals shall be minimal. Final measurement of air quantity shall be made after optimum air pattern has been achieved.

System Type	CFM Range	Allowable Deviation
Supply\Return	0-50	+ or –5 CFM
	50-1,000	+ or – 10%
	>1,000	+ or – 5%
Exhaust / 100% OA Supply	0-50	+ 5 CFM
	50-1,000	+ 10%
	>1,000	+ 5%

   6. The total air delivery in any particular fan system shall be obtained by adjustment of the particular fan speed. The drive motor of each fan shall not be loaded over the corrected full load amperage rating of the motor involved. Where belt drive fans are used in conjunction with VFD's, the fan speed shall be adjusted by changing pulleys such that fan speed to achieve design airflow occurs at 60 Hz. These sheave and pulley changes shall be included in the Contractors scope of work.
   7. Adjust quantity of air on each zone to the values given in the specifications and/or plans.
   8. If the total system fan volume (supply, return, exhaust, relief) and outdoor air volume are not within plus or minus 5% of the design capacity at design RPM, determine the reason by reviewing all system conditions, procedures and recorded data. Check and record the air pressure drop across filters, coils, eliminators, sound traps, etc., to see if excessive loss is occurring. Particularly study duct and casing conditions at the fan inlet and outlet.
   9. Any changes that are required for the final balancing results will be provided for by the respective Contractors who supplied and installed such equipment under their contractual obligations. Such changes may encompass, but are not necessarily restricted to, the changing of pulleys, belts, dampers or adding dampers or access holes.

3.04 BALANCE AND PERFORMANCE DATA REPORT [TD]:

A. General: Each heating, ventilating and air conditioning system shall be operated and tested continuously for at least two consecutive days to verify that the system is operating satisfactorily and safely and that all equipment is producing the required capacity. To be successful, this test must be conducted with all controls in automatic position and all lights on or off to simulate day time or night time use of the building. Submit two typewritten copies of reports covering air and water system balance and performance. Reports must be received by the Architect-Engineer at least one week prior to the Contractor's request for a substantial completion inspection. Reports that contain deficiencies related to incomplete or improper system installation will be rejected by the Engineer without further review.

B. Calibration Data: The report shall include a list of all instrumentation used and the date of the most recent calibration for each instrument.

C. Balance Data: The following balance data shall be provided. Design and actual water and air flows shall be provided in tabular form.
   1. All Air Handling and Air Conditioning Equipment Used for Heating, Cooling and Ventilating:
      a. System nomenclature and identification.
      b. Nameplate information: Manufacturer, model and serial number, horsepower, rpm, voltage, phase, maximum amperage.
      c. Fan speed.
      d. Static pressure profile – reading between all components and total external static pressure.
      e. Outside, return, and supply air quantities.
      f. Actual running motor amperage.
      g. For all VAV units, provide location of downstream static pressure sensor, set point (if applicable), and reading.
      h. For all VAV units, provide VFD speed setting (Hz) at both minimum and maximum flow (at final balanced condition).
      i. Final fan operating point plotted on appropriate fan curve.
   2. Fans:
      a. System nomenclature and identification.
      b. Nameplate information: Manufacturer, model and serial number, horsepower, rpm, voltage, phase, maximum amperage.
      c. Fan speed.
      d. Total external static pressure.
      e. Air quantity.
      f. Actual running motor amperage.
      g. Final fan operating point plotted on appropriate fan curve.
   3. Air Outlet and Inlet:
      a. Room identification.
      b. Manufacturer.
      c. Size.
      d. Free area factor.
      e. Air quantity.
      f. Velocity.
   4. Kitchen Hoods:
      a. Nameplate information: Manufacturer, model and serial number.
      b. Total exhaust airflow, total supply airflow (where applicable).
      c. Hood face velocities.

D. Performance Data: The following information shall be recorded twice each day and twice each night during the performance test. Reading shall be taken for each item at a different time each succeeding day at least two hours later than the time the reading was taken on the preceding day.
   1. All Air Handling and Air Conditioning Equipment Used for Heating, Cooling and Ventilating (except for unit heaters, VAV boxes, and cabinet unit heaters):

a. System nomenclature and identification.
b. Dry bulb and wet bulb temperatures entering and leaving all coils.
c. Water flow through all coils.
d. Water temperatures entering and leaving all coils.
e. Water pressure drop through all coils.
f. (Test all electric heating coils for operation of low airflow interlock.)

2. Heat pumps:
   a. System nomenclature and identification.
   b. Nameplate information: Manufacturer, model and serial number.
   c. Dry bulb and wet bulb temperatures entering and leaving indoor and outdoor coils.
3. Domestic water heater:
   a. Nameplate information: Manufacturer, model and serial number.
   b. Boiler water flow.
   c. Boiler water temperatures entering and leaving heat exchanger.
   d. Storage tank temperature and setpoint.
4. Space Pressurization:
   a. Measure and record space pressurization in corridor served by each major air handling unit.
   b. Coordinate with Controls Contactor for fan speed adjustments to achieve space pressurization setpoint of 0.05” w.c. (adjustable).
5. Temperature: Each Room in Building. Temperature measurements shall be taken with the Contractor’s calibrated equipment. Trended data from the temperature control system is not acceptable.

E. Control Setting: During the performance and balance tests, control settings may require adjustment, and if so, shall be adjusted to produce the best balanced system operation. The final setting of each operating and safety control shall be recorded. This shall include, but not be limited to, thermostats, limit controls, damper position switches, firestats, freezestats, humidistats, aquastats and other similar items.

3.05 HVAC SYSTEMS FINAL TESTS:

A. Upon completion of the work, in accordance with these drawings and specifications, the Contractor shall make a final test in the presence of the Architect-Engineer. With all equipment energized and all controls in automatic position, the systems and equipment specified herein shall be proven to operate safely and to heat and cool the structure uniformly. If not, adjustments and corrections shall be made until satisfactory operation is achieved.

3.06 HVAC SYSTEM POST ACCEPTANCE TESTS:

A. Should completion of the building occur at such time that the required performance test must be conducted and test data recorded and submitted during a season when both heating and cooling system performance cannot be checked, the Contractor shall perform the tests and record all such data as is available with system operating automatically under the prevailing weather conditions. That part of the system portion which cannot be recorded because of the prevailing weather shall be delayed until the weather is appropriate at which time the remaining part of the required tests shall be conducted and data recorded accordingly. Portions of the tests may not be delayed without written consent of the Engineer.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Piping Insulation
2. Ductwork Insulation
3. Equipment Insulation

C. Related Sections:

1. Section 23 00 10 – HVAC General Requirements
2. Section 23 05 00 – Common Work Results for HVAC
3. Section 23 20 00 – HVAC Piping and Pumps
4. Section 23 30 00 – HVAC Air Distribution
5. Section 23 80 00 – Decentralized HVAC Equipment

1.02 SUBMITTALS:

A. Submit shop drawings in accordance with Division 1 and Section 23 00 10.

B. Submit shop drawings and catalog data for each type of material proposed for this project. Indicate thickness of material for individual services, and installation methods.

1.03 REFERENCES:

A. General: The following standards or codes (latest edition) form a part of this specification to the extent indicated by the reference thereto.

B. American Society for Testing and Materials (ASTM):

ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building materials.

ASTM C 411 Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

C. National Fire Protection Association (NFPA):

Standard 255 Method of Test of Surface Burning Characteristics of Building Materials

D. Underwriters Laboratories, Inc. (UL)

Standard 723 Tests for Surface Burning Characteristics of Building Materials

PART 2 - PRODUCTS:

2.01 GENERAL

A. Acceptable Manufacturers:

1. Manville, Owens Corning, Armstrong, IMCOA, Knauff or Certain-Teed except where specific manufacturer is named.

B. All insulation materials, jackets and fitting covers shall have a composite flame spread rating not exceeding 25, and a smoke developed rating not exceeding 50 as tested under procedure ASTM E-84-75, NFPA 255 and UL 723. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411.

2.02 MATERIALS

A. Piping:
   1. Cold Water (0°-95°F): Fine heavy density fibrous glass or rigid phenolic foam insulation with factory applied foil-scrim-white kraft paper vapor barrier jacket, molded to conform to piping, 0.24 btu•in./sq.ft./°F/hr. maximum “K” value at 75° F.
   2. Hot Water (100°-225°F): Fine heavy density fibrous glass, rigid phenolic foam or calcium silicate insulation with general purpose jacket, molded to conform to piping, 0.25 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F.
   3. Hot Water (100°-225°F), Steam and Steam Condensate: Fine heavy density fibrous glass or calcium silicate insulation with general purpose jacket molded to conform to piping, 0.30 btu•in./sq.ft./°F/hr. maximum “K” value at 200°F (mean).
   4. (Cold Water), Refrigerant, and Interior Condensate Drain Piping: Closed cell flexible elastomeric insulation, 0.28 btu•in./sq.ft./°F/hr maximum “K” value at 75°F for thicknesses 1.5” and greater, and 0.25 btu•in./sq.ft./°F/hr maximum “K” value at 75°F for thicknesses 1” and less. Maximum water vapor transmission rating of 0.08 perms-inch for thicknesses 1.5” and greater and 0.05 perms-inch for thicknesses 1” and less. Insulation located outside the building shall have a selective finish to protect insulation from ultra violet (UV) solar radiation, unless specifically designed to withstand UV radiation. All piping exposed to view in finished spaces shall be provided with coating suitable for painting or tinting to match surroundings. (Insulation on underground and underfloor piping shall be closed cell polyolefin, 1” thick, with water vapor transmission rating of 0 perms-inch.)

B. Ductwork:
   1. Exposed Rectangular Ducts: Rigid fibrous glass insulation, 3.0 lb. density, 0.24 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F, with factory applied reinforced aluminum foil vapor barrier. (Insulation to be exposed in public, finished areas shall have factory applied reinforced white Kraft all service jacket for painting.)
   2. Grease Duct: Refer to Specification Section 23 30 00.
   3. Dryer Vents concealed above ceilings: Wrap shall be Firemaster DryerWrap as manufactured by Morgan Thermal Ceramics or equivalent by 3M or Unifrax. Wrap shall be ½ inch thick, 8 PCF, and shall be listed and labeled by UL in accordance with ASTM E84 and E814.
   4. Round Ducts, Flat Oval Ducts and Concealed Rectangular Ducts: Flexible fibrous glass insulation, 1.0 lb. density, 0.27 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F, with factory applied reinforced aluminum foil vapor barrier.
   5. Acoustic Lining (where indicated and/or noted on Drawings): Fiberglass insulation, 0.26 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F, absolute roughness of exposed surface shall not exceed 0.005 ft., coated to prevent erosion at air velocities up to 2000 fpm, 1.5 lbs/cu.ft. minimum density. Noise reduction co-efficient shall average not less than 0.60 when tested by Acoustical Material Association procedure mounting 6. Liner shall be provided with EPA approved biocide in the erosion coating to protect against microbial growth. Liner shall meet or exceed requirements of ASTM G21 (fungi resistance) and ASTM G22 (bacterial resistance). Acoustic lining shall be one inch thick unless specifically noted otherwise.
   6. Acoustic Lining (where indicated and/or noted on Drawings): NBR/PVC-based closed cell flexible elastomeric insulation, similar to K-Flex Duct Liner Gray, 0.25 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F, suitable for use at air velocities up to 4,000 fpm, 3.0 lbs/cu.ft. minimum density. Noise reduction co-efficient shall average not less than 0.55 when tested in accordance with ASTM C423. Liner shall have a water vapor permeability of less than 0.06 perm-in when tested in accordance with ASTM E96, and shall meet or exceed the requirements of UL 181, ASTM G21, and ASTM C1338 for mildew and fungi resistance. Acoustic lining shall be one inch thick unless specifically noted otherwise.

C. Duct and Equipment lagging [S] shall by Kinetics KNM mass-loaded. Limp, vinyl barrier material and shall consist of a single layer of loaded vinyl noise barrier. The loaded vinyl noise barrier shall have a density of 1.0 PSF or 2.0 PSF, as noted on the Drawings, and a thickness of .10 inches for 1 PSF type and .20

inches for 2 PSF type. STC rating shall be 26 or greater for 1 PSF type and 31 for 2 PSF type. All materials shall be suitable for installation in a plenum.

D. Hot and Cold Equipment: Rigid fibrous glass insulation molded or fitted to conform to equipment, 0.24 btu•in./sq.ft./°F/hr. maximum “K” value at 75°F.

E. Sealants, Mastics and Adhesives: Products either manufactured by or recommended by the insulation material manufacturer.

PART 3 - EXECUTION:

3.01 PREPARATION

A. Do not install insulation before piping(, medium/high pressure ductwork) and equipment have been tested and approved.

B. Ensure surface is clean and dry prior to installation. Ensure insulation material is undamaged and dry before application. Finish with system at operating conditions and temperature.

3.02 INSTALLATION

A. General: Ensure insulation is continuous through inside walls and partitions. Insulated piping passing through (smoke barriers,) smoke partitions, fire walls, fire partitions, and fire rated floors shall have insulation of type, thickness and density to match U.L. Through-Penetration Firestop Systems as specified in Section 23 00 10 under Sleeves and Inserts. Insulated piping passing through nonfireresistance rated floors shall be fireblocked as specified in Section 23 00 10 under Sleeves and Inserts. Insulated ducts passing through smoke partitions and fire rated assemblies where a fire damper is not required shall be insulated with calcium silicate for a length equal to twice the thickness of the wall with all voids between the sleeve and duct insulation tightly packed with mineral-wool insulation or U.L. approved packing with sealant. All penetrations through equipment room walls and other areas of noise or heat generation shall be tightly sealed with mineral fiber rope. Finish insulation neatly at hangers, supports and other protrusions.

B. Piping:

1. General:
   a. All pipe insulation (except refrigerant piping) shall be secured with outward clinching stainless steel staples and sealer.
   b. All fittings and valves shall be insulated and jacketed with the same material as the adjacent piping or it may be finished with a smooth coat of approved insulating cement and jacketed with an approved recovering cloth and vapor sealed. Where PVC fitting covers are used, insulation shall be wrapped tightly using sufficient quantities to prevent deformation of covers.

OR

   c. Use mitered segments of insulation on elbows and oversized insulation on valves and tees coated with two coats of vapor barrier mastic, reinforced with glass fabric extending two inches onto adjacent pipes, and same diameter as adjoining covering. No plastic materials on fittings will be allowed.
   d. Mitering of straight pipe insulation to form elbows will not be acceptable or allowed.
   e. All jacket joints and seams shall be lapped not less than 2”.
   f. Insulation exposed to weather (and insulation exposed to abuse in finished spaces) shall be covered with minimum 0.016 aluminum jacket with all joints sealed weather-tight.
   g. Insulation at pipe hangers shall include H-Block Pipe Support insulation as manufactured by ICA Insulation. Supports shall be pre-formed sections of molded fiberglass, minimum 12” long, quantity as suggested by the manufacturer for a given pipe size. Insulation shall be ASTM E84 25/50 rated and shall have a service

temperature rating of -120°F to +1000°F. Supports shall have a minimum density of 18 lb. cu./ft. and a maximum “k” value of .30. Pipe hangers shall be oversized to enclose pipe and insulation. Provide sheet metal saddle between hanger and insulated pipe. Supports shall be placed between the bottom of the pipe to be supported and the metal shield. On pipe sizes above 5" IPS, supports should be oriented along the bottom 60° arc of the system. The thickness of the support should be the same thickness as the insulation system. For pipes smaller than 1.5”, supports may be metal saddles only.

h. (Insulation at pipe hangers for exterior condenser water shall be calcium silicate in preformed sections 12” long enclosing pipe around entire circumference. Pipe hangers shall be oversized to enclose pipe and insulation. Provide sheet metal saddle between hanger and insulated pipe.)

i. (Insulation at pipe hangers shall be Insuguard Pipe Saddle by Armacell. Supports shall be minimum 12” in length and constructed from a polypropylene copolymer. Support shall be UV resistant and have a service range of -40°F to 178°F. The surface shall be non-adhesive to allow for linear expansion of thermal insulation. Entire support shall be UL-723 and ASTM E84 classified. Saddle shall come complete with top cover, similar to Insucover by Armacell, constructed of the same materials as the saddle, to provide a full 360°F of coverage. Elastomeric and other foam insulations shall be installed without stretching or compressing individual lengths. Where new pipe insulation is installed, new supports shall also be provided.)

j. Elastomeric and other foam insulations shall be installed without stretching or compressing individual lengths.

k. (Jacket all exposed insulated piping, fittings and equipment with 8 oz. Canvas jacket pasted on smoothly with Foster 95-90 adhesive and the entire outer surface shall receive one flooding brush coat of Foster 81-42 fire retardant white coating.)

2. Cold Piping:
   a. Insulation shall be terminated one inch each side of unions and flanges. Larger size removable sections of insulation shall be secured over the flange or union and lapped over the pipe insulation not less than 3” each side of pipe insulation termination point.
   b. All joints, voids and punctures in jacket and all exposed edges of insulation material shall be vapor sealed.
3. Hot Piping:
   a. Insulation shall be terminated neatly at unions, flanges, and valves. All exposed edges of insulation materials shall be sealed.
   b. All unions and flanges shall be insulated per MICA Plate 2-135.
   c. All valves shall be insulated per MICA Plate 2-130, 2-530, or 2-135.
   d. Where heating coils are located downstream from cooling coils and at variable air volume units, piping shall be insulated continuously up to the coil. Insulation shall be vapor sealed and installed as specified for cold piping for a distance of 5 feet from the coil.
4. Refrigerant Piping: Cover all valves and fittings with equivalent thickness of insulating material. All edges shall be tightly butted. Seal all joints vapor tight.

C. Ductwork:
1. External:
   a. Rigid duct insulation shall be secured to rectangular ducts with mechanical fasteners such as metal stick clips or cupped head weld pins located a maximum of 3” from each edge and spaced a maximum of 12” on center each way. All insulation joints shall be tightly butted. All joints, voids and punctures in facing shall be sealed vapor tight with pressure sensitive foil tape and mastic.
   b. Flexible duct insulation shall be provided with a minimum 2” facing flap overlapping adjacent and connecting insulation. Seams shall be stapled approximately 6” on center with ½” outward clinching staples. Where rectangular ducts are 24” in width or greater, insulation shall be secured to the bottom of the duct with mechanical

fasteners to prevent sagging. All insulation joints shall be tightly butted. All joints, voids and punctures in facing shall be sealed vapor tight with mastic.

2. Internal: The lining shall be applied to cut-to-size pieces fastened to the entire interior of the duct with mastic, stick clips and speed washers. Edges and joints shall be coated with fire resistant mastic. External duct insulation is not required on ducts with internal lining unless noted otherwise. Where elastomeric lining is used, mechanical fasteners shall be used in addition to the adhesive in accordance with SMACNA guidelines. (External duct insulation shall be provided on all ducts with, or without internal lining in unheated attic spaces and where exposed to outside conditions.)
3. Ductwork exposed to outside conditions shall be insulated as specified herein and covered with minimum .025 inch thick aluminum jacket with seams lapped a minimum 3", sealed with silicon caulk. Covers shall be neatly finished and completely watertight.
4. Where duct mounted heating coils are located downstream from cooling coils and at variable air volume terminal units the coil shall be provided with vapor-sealed external duct insulation on sides, top and bottom.
5. Where ductwork is indicated to have internal acoustic lining, sheet metal drops to diffuser and register necks shall be unlined and shall be externally insulated.
6. The top of all diffusers shall be insulated to cover the entire top surface area, including flex duct transitions, and vapor sealed
7. (See Section 23 30 00 for insulation on kitchen exhaust ducts.)

D. Hot Equipment: Apply insulation with edges tightly butted, joints staggered and secured in place by steel bands not over 12" on center. Provide sufficient clearance around openings for normal operation of equipment. Finish with two 1/2" thick coats of insulating cement over chicken wire. Second coat shall be mixed 2 to 1 by weight with Portland cement and troweled smooth.

E. Boiler Breeching: Insulation shall be similar to that specified for Hot Equipment except insulation shall be held away from breeching at least one inch with angles, welded studs or clips.

F. Cold Equipment: Insulation shall be secured in place with 16 gauge annealed tie wire, finish with 1/2" thick coat of insulating cement and vapor barrier mastic applied over entire body.

G. Chilled Water Pumps: Install .040 aluminum enclosure with all seams and joints soldered watertight and lined with 2-inch thick rigid fiberglass insulation board and spring latches. Enclosure shall be fabricated and installed to facilitate removal for servicing pump and components. As an alternate, custom fit insulating blankets, similar to those manufactured by Fit Tight Covers, may be utilized.

H. (Damaged Insulation: All existing thermal coverings that are removed or damaged during construction shall be replaced or repaired to not less than original condition. Repaired sections shall provide equal or better thermal performance and vapor protection.)

I. (Patching: Where existing control, monitoring or other penetrating devices are removed from ductwork or piping, the insulation shall be patched to match thickness, type and finish of existing insulation.)

J. (Where existing insulation has been removed under the scope of asbestos removal, insulation shall be replaced as indicated for new work. Refer to the drawings for the extent of the existing piping to be reinsulated.)

3.03 INSULATION THICKNESS SCHEDULE

A. Piping:

Type	Size, Inches	Insulation Thickness, Inches
Chilled water	1" and Under	1
	1-1/2"	1-1/2

	2” and Over	2
Ice System Water	All	1-1/2
Condenser Water (Exposed to Outside)	All	1-1/2
Heating Water	1-1/4” and Under	1-1/2
	1-1/2” and Over	2
	*Runouts 1” and Under	1
Steam & Condensate Return	1-1/4” and Under	2-1/2
	1-1/2”	3
	2” and Over	4
Refrigerant Suction	All	1
Heat Pump Refrigerant Liquid	All	1
Waste Lines Carrying Condensate from A/C Units, Ice Makers, etc.	All	1/2

*Runouts to individual terminal units less than 4 feet in length (between the control valve and coil for HVAC piping).

B. Ductwork:

Type	Insulation Thickness Inches, External
Outside Air Intake and Untempered Supply	2
Supply (Heating and Cooling)	1-1/2
Return (Equip. Room Only)	1-1/2
Plenums	1-1/2
Exhaust (Between MOD & Louver)	2
Supply & Return Exposed to Outside Air Conditions (& in Attic Space)	2

C. Hot Equipment:

Type	Insulation Thickness, Inches
Converters	2
Expansion Tanks	1
Hot Water Storage Tanks	2
Air Separator	1

D. Cold Equipment:

Type	Insulation Thickness, Inches
Chilled Water Pumps	2
Compression Tanks	1
Air Separator	1

END OF SECTION

SECTION 23 0800

COMMISSIONING OF HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Coordination and Cooperation with Commissioning Agent and participation in the commissioning process indicated in Section 019113.
2. Providing for commissioning work in the project construction schedule.
3. Commissioning work shall be a team effort to ensure that all mechanical equipment and systems have been completely and properly installed, function together correctly to meet the design intent, and document system performance parameters for fine-tuning of control sequences and operational procedures. Commissioning shall coordinate system documentation, equipment start-up, control system calibration, testing and balancing and performance testing.
4. The commissioning team shall be made, up of representatives from the owner, design professionals, major equipment suppliers, and construction trades. The trades represented on the commissioning team shall include, but not be limited to, sheet metal, piping and fitting, controls, test and balance, and electrical. The lead person for each trade who will actually perform or supervise the work is to be designated as the representative to the commissioning team.

C. Related Sections:

1. Section 23 00 10 – HVAC General Requirements
2. Section 23 05 00 – Common Work Results for HVAC
3. Section 23 05 53 – Identification for HVAC Piping and Equipment
4. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
5. Section 23 09 00 – Instrumentation and Control for HVAC
6. Section 23 20 00 – HVAC Piping and Pumps
7. Section 23 30 00 – HVAC Air Distribution
8. Section 23 80 00 – Decentralized HVAC Equipment
9. Section 24 00 10 – Commissioning Requirements of HVAC Systems

1.02 SUBMITTAL DATA:

A. Require all equipment suppliers to provide data required by the Commissioning Agent of type and in quantities as indicated in Section 24 00 10.

1.03 CONTRACTOR RESPONSIBILITIES:

A. General: Division 23 contractor responsibilities shall include active participation in the commissioning process as defined in Section 24 00 10 to facilitate successful completion of the contract. Ensuring all subcontractors and equipment suppliers cooperate in the Commissioning process. The Contractor shall coordinate with the Commissioning Agent to produce complete, operating systems, properly adjusted and tuned for comfortable operation and optimum efficiency.

B. Commissioning is primarily the responsibility of the Commissioning Agent indicated in Section 24 00 10, with support for start-up, testing, and support for commissioning, the responsibility of Division 23 contractor. The commissioning process does not relieve Division 23 contractor from participation in the process or diminish the role and obligations of Division 23 contractor to complete all portions of the work in a satisfactory and fully operational manner. In general, Division 23 is to perform all check-outs, start-ups, testing, adjusting and balancing with the

Commissioning Agent witnessing all tests and performing verification tests as follow-up. The Commissioning Agent will also serve as an additional reviewer of all equipment and material installations for compliance with the Contract.

C. Division 23 contractor shall be an active member of the Commissioning Team composed of representatives from the Owner, Architect/Engineer, Contractor, contractor's trades and major equipment suppliers.

D. See Section 24 00 10 for additional Division 23 responsibilities.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 Division 23 Commissioning Responsibilities:

A. Identify a Division 23 Contractor's representative to the Commissioning team within one month after award of Contract. The representative shall have authority to make decisions on behalf of the Contractor.

B. Participate in Commissioning Meetings designated by the Commissioning Agent.

C. Performance verification tests shall be conducted as appropriate during cooling season and during heating season. Provide qualified personnel for participation in commissioning tests including seasonal testing required after initial commissioning.

D. Provide qualified personnel from each trade for participation in commissioning meetings as designated by the meeting agenda.

E. Participate in resolving issues identified by the Commissioning Agent.

F. Correct identified deficiencies to fulfill contract and warranty requirements.

G. Provide copies of all Contract documentation to the Commissioning Agent.

H. Participate in Owner Training as set up by the Commissioning Agent.

I. Inspect, check and confirm the correct and complete installation of all equipment in accordance with verification checklists as provided by, or as approved by the Commissioning Agent. Contractor's standard quality control verification checklists may be used, however minimum requirements shall be as indicated under Section 24 00 10, system Verification Checklists. Copies of all Contractor's completed, signed verification checklists shall be furnished to the Commissioning Agent.

J. Notify Commissioning Agent a minimum of 2 weeks in advance of scheduled equipment and system verifications and start-ups. See Section 24 00 10 for listing of systems and subsystems to be evaluated by the Commissioning Agent in the commissioning process.

K. Notify Commissioning Agent a minimum of 2 weeks in advance of start-up of Testing, Adjusting and Balancing (TAB) work. Arrange and attend meeting between Commissioning Agent and TAB agency for review of TAB procedures, TAB work plan and TAB schedule.

L. Notify Commissioning Agent a minimum of 2 weeks in advance of controls work of Section 23 09 00 for the following procedures:

1. Point-to-point wiring check-out,
2. Owner verification of controls graphics, setpoints and alarms,
3. System start-up and check-out,
4. Initial system tuning,
5. Owner training.

M. Correct all construction and equipment deficiencies found during the commissioning process where in accordance with the Contract. Where any correction, improvement or change is

outside of the Contract, as agreed by the Commissioning Team, prepare and submit a contract change proposal for the work in a timely manner. The Owner may elect to accept, reject or negotiate such contract change proposals.

END OF SECTION

SECTION 23 0900

INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

B. Work Included:

1. Complete System of Automatic Controls
2. Electric Appurtenances
3. Direct Digital Controls (DDC)
4. (Pneumatic Actuation)

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 05 53 – Identification for HVAC Piping and Equipment
5. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
6. Section 23 09 93 – Sequence of Operations for HVAC Controls
7. Section 23 20 00 – HVAC Piping and Pumps
8. Section 23 30 00 – HVAC Air Distribution
9. Section 23 80 00 – Decentralized HVAC Equipment
10. Division 26 – Electrical
11. Division 27 – Electrical

1.02 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Division 1 and Section 23 00 10.

B. Provide complete shop drawings, catalog data sheets and such other data necessary to fully describe and substantiate compliance with these specifications for all control items and systems included in this section.

C. Shop drawings shall indicate the exact location(s) of the outdoor temperature sensor(s).

D. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials indicated in this Section.

E. Application Software Documentation: Contractor shall provide a blueprint documentation of the software application program for each stand-alone digital controller. Documentation shall include block software flowchart showing the interconnection between each of the control algorithms and sequences. A program listing shall be printed on the same blueprint, along with the program flowchart, and description of the sequence of operation. This blueprint shall be stored and maintained in each stand-alone digital controller. System acceptance shall not be completed until this documentation is provided and located in each panel.

F. Control System Diagrams – Provide schematic diagrams for each controlled system. Illustrate the relationship between control system and controlled equipment. Show all control elements.

G. Contractor shall provide the Owner with all engineering software/modules, passwords, documentation, communications cords, product engineering documentation, as-built/submittal drawing documentation, and Owner training on operation and maintenance of the control system at the time that the job is turned over and operational. Documentation shall include network architecture with all controllers identified in architecture, point list identifying the termination and function of point to each controller, and a brief sequence of operation. Warranty

of all control work will begin when job is complete and communicating with the Owner's BAS network, not when the structure or space becomes occupied.

1.03 QUALITY ASSURANCE:

A. System Integrator Qualifications
   1. The HVAC Control System shall be furnished, engineered, and installed by licensed Controls Contractor or System Integrator (SI). All work provided under this section shall be provided by direct employees of the SI or under the direct supervision of the SI personnel.
   2. The SI must be regularly engaged in the installation of Niagara Framework based systems as specified herein. The SI shall have a minimum of 5 years experience in the sales, installation, engineering, programming, servicing and commissioning of BAS.
   3. The SI must be an authorized factory direct representative in good standing of the manufacturer of the proposed hardware and software components.
   4. The SI shall have an office that is staffed with a minimum of 4 technicians who have successfully completed the factory authorized training of the proposed manufacturers hardware and software components and have successfully completed a Niagara Framework approved course. SI must provide proof of required training. The SI capabilities shall include engineering and design of controls systems, programming, electrical installation of control systems, trouble shooting and service.
   5. The SI shall submit a list of no less than three (3) similar projects, which have similar Building Automation Systems as specified herein installed by the SI. These projects must be on-line and functional such that the Owner's/User's representative can observe the system in full operation.

B. When all temperature controls have been installed, the temperature control contractor shall completely commission the system to verify that all systems and components are operating in accordance with the specifications. Where corrections or adjustments to the controlled equipment are required, the temperature control contractor shall document such changes to the Contractor and recheck the control system once the changes have been made.
   1. All equipment and subsystems shall be operated through all specified modes of control and sequences of operation, including full load and part load conditions.
   2. All physical valve and damper positions shall be visually verified to correspond with the positions indicated by the controls software.
   3. All instrumentation shall be properly calibrated.

C. Final point-to-point check-out and commissioning of the Temperature Control System shall be by the temperature control manufacturer or its exclusive authorized representative.

D. At the completion of this project, the Contractor shall submit a letter to the Engineer stating that all controls have been installed as specified, that each system has been calibrated and that each system is operating in a safe and efficient manner. Included with the letter, the Contractor shall provide a printout of all status control and monitoring points for a 48-hour period at 4-hour intervals, one printout of each type of report available, and a copy of the completed start-up checklist used by the technician during system verification.

E. Communication gateways are prohibited, except for on-board controllers/cards that are standard options of packaged equipment such as boilers, boiler draft controllers, etc.

F. All software tools needed for full functional use, including programming/configuration of controllers, network management and expansion, and graphical user interface use and development, of the BAS described within these specifications shall be provided to the Owner or his designated agent. Any licensing required by the manufacturer now and into the future, including changes to the licensee of the software tools and the addition of hardware corresponding to the licenses, to allow for a complete operational system for both normal day-to-day operation and servicing shall be provided. Any such changes to the designated license holders shall be made by the manufacturer upon written request from the Owner or their agent.

G. The Owner shall be named license holder of all software associated with any and all work on the project. In addition, the Owner shall receive ownership of all job specific configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code, database and documentation for all configuration and programming that is generated for a given project and/or configured for use with the NAC, PEC or CC controllers, and any related LAN/WAN/Intranet and Internet connected routers, switches or other devices. Any and all required ID's and passwords for access to any component shall be provided to the Owner.

H. The SI shall provide a minimum 5-year Tridium software maintenance agreement (SMA) with the license under this section.

I. All contractor-provided controllers must be BACnet-based. All BACnet devices shall be BTL (BACnet Testing Laboratory) certified, no exceptions.

J. The Niagara 4 network backbone shall be configured with a Niagara 4 configuration tool, with a fully open license.

1.04 SCOPE OF WORK:

A. Furnish and install complete direct digital temperature control systems (DDC). The DDC system shall consist of one or more programmable BACnet DDC controllers communicating over a BACnet Network to the Network Area Controller. All programming of the programmable BACnet Controllers and the Network Area Controller shall be provided by the contractor.

B. Furnish new hydronic system control valves and damper actuators for installation by the Mechanical Contractor as indicated.

C. Provide programmable equipment controllers and configurable controllers including all required sensors, transmitters, switches and related field control interface wiring as indicated on the drawings.

D. Provide all programming, checkout and graphics generation to fully integrate the mechanical equipment into the Owner's Facility Management System. Graphical User Interface programming shall conform to the following:

1. Graphical User Interface programming shall reside in and be served from the Network Area Controller. Programming shall not be contained in or dependent upon a remote server.
2. Program a Graphical User Interface (GUI) web page (screen) on the Network Area Controller for the replacement mechanical equipment/systems. In addition to all data being graphically depicted on the mechanical equipment's schematic diagram on the GUI screen, each point of data shall also include a clear English language description adjacent to its graphical depiction.
3. Graphical User Interface web page shall depict as a minimum:
4. All hardware inputs/outputs associated with each piece of mechanical equipment.
5. All adjustable setpoints associated with the equipment's sequence of operation.
6. Access to any relevant schedule, programs, trends associated with each piece of mechanical equipment.

E. The direct digital control system shall be comprised of a network of various independent, stand-alone digital controllers, together with Centralized Control Stations, and Centralized Host Stations as specified to provide centralized access and facility wide control functions. The stand-alone digital controllers shall be interconnected in a communicating network to provide facility wide access and sharing of information. A Local Area Network (LAN) shall be provided to interconnect the stand-alone digital controllers for high-speed data transmission within the building.

1. The Temperature Controls Subcontractor shall provide technical support for the Testing and Balancing Subcontractor. The technicians shall be fully qualified in all aspects of the system and shall have extensive knowledge of the project. Support shall include, but not be limited to the following:
   a. Assistance in determining hydronic and air systems pressure setpoints.

b. Assistance in determining proper automatic damper positions for all air handling units, air conditioning units, and VAV units.
c. Simulating conditions as necessary for proper and optimized testing and balancing of the air and hydronic systems

F. Programming shall be provided in accordance with commonly accepted industry standards and practices to ensure proper and efficient control of all equipment and systems. Where ASDC's with factory programming are not capable of operating systems in the sequence described herein, the Contractor shall provide a digital controller with custom programming.

G. Programming shall be provided to accomplish the sequence of operations as described in Section 23 09 93. Changes to the operational sequences shall be made only with written approval from the Engineer.

H. Graphical transitions from page to page will be through an on the page button system. All graphical pages will have a button that references the Main Floor Plan page, Section of Floor Plan page that the equipment space temperature is displayed on and the graphical page of the equipment that serves that piece of equipment being displayed. I.e., a VAV box graphic should have a transfer button for the Main Floor Plan, the Section of Floor Plan that its space temperature is displayed on and the RTU/AHU that supplies its primary air. Chilled Water transfer buttons will be provided on all Floor Plan pages, RTU/AHU pages and each other respectively. A Nav Tree driven system is not acceptable primary transfer option. It can be used as a secondary/backup to the button transfer system.

I. The Main graphic of the building will be representative of the actual floor plan. It is preferred for the space temperatures of all equipment to be displayed on the Main graphic along with the button transfers. The space temperature will also be a transfer button to that respective piece of equipment's graphic. If the amount of data is to great for the main page to accommodate. The Main graphic can be used as a graphics representation of the building's layout that also provides transfers to appropriate sections of floor plans. Each floor plan section will depict the respective space temperature for the areas they serve, the space temperatures will also be transfer buttons to the respective equipment graphic, and the buttons necessary to transfer to the major equipment relevant to the section of floor plan.

J. Electrical Coordination:
1. BAS Contractor shall coordinate the location of all control panels with Division 26 and 27. All power circuits and communication network/devices necessary for the control panels shall be provided within the Contract.
2. Power wiring indicated (device and circuit designation indicated) on the drawings shall be provided under Division 26.
3. The BAS manufacturer shall be responsible for coordinating the required voltage for all motor operated dampers associated with fans. The damper actuator shall match the voltage of the associated fan for all fans.
4. The BAS manufacturer shall be responsible for power wiring not indicated (device or circuit designation not indicated) on the Drawings. It shall be the BAS contractor's responsibility to review the Contract Documents to determine the extent of power wiring included in Division 26 and to provide additional power wiring as required. Work shall be in accordance with Division 26 specifications and all local, state and national codes and ordinances.
5. The BAS manufacturer shall be responsible for data cabling not indicated (device not indicated) on the Drawings. It shall be the BAS contractor's responsibility to review the Contract Documents to determine the extent of data cabling included in Division 27 and to provide additional data cabling as required. Work shall be in accordance with Division 27 specifications and all local, state and national codes and ordinances.
6. Where the contractor performing work under this section requires an additional circuit for power wiring to a device or panel under section above, an RFI shall be issued requesting approval to use an available circuit in the nearest panel. Once approval is granted, all wiring and conduit from the breaker to the device or panel shall be provided under this section of the specifications.

7. Where the contractor performing work under this section requires an additional communication network\device under section above, an RFI shall be issued requesting approval to use an available opening in the nearest switch. Once approval is granted, all cabling and conduit from the switch to the device shall be provided under this section of the specifications.

1.05 COMMISSIONING OF HVAC SYSTEMS:

A. Refer to Division 1 for work of Commissioning Agent and coordination with work of Division 23.

B. Notify Commissioning Agent a minimum of two weeks in advance of controls work for the following procedures:
   1. Point-to-point wiring check-out,
   2. Owner verification of controls graphics, setpoints, and alarms,
   3. System start-up and check-out,
   4. Initial system tuning,
   5. Owner training.

C. Provide all trending of all points as requested by the Engineer and Commissioning Agent, and as required to demonstrate changing system operation.

D. When all temperature controls have been installed, the temperature control contractor shall completely commission the system to verify that all systems and components are operating in accordance with the specifications. Where corrections or adjustments to the controlled equipment are required, the temperature control contractor shall document such changes to the Contractor, and recheck the control system once the changes have been made.

E. All equipment and subsystems shall be operated through all specified modes of control and sequences of operation, including full load and part load conditions.

F. All physical valve and damper positions shall be visually verified to correspond with the positions indicated by the controls software.

G. All instrumentation shall be properly calibrated.

H. Final point-to-point check-out and commissioning of the Temperature Control System shall be by the temperature control manufacturer or its exclusive authorized representative.

I. At the completion of this project, the Contractor shall submit a letter to the Engineer stating that all controls have been installed as specified, that each system has been calibrated and that each system is operating in a safe and efficient manner. Included with the letter, the Contractor shall provide a printout of all status control and monitoring points for a 48-hour period at 4-hour intervals, one printout of each type report available, and a copy of the completed start-up checklist used by the technician during system verification.

1.06 SPARE PARTS:

A. Provide spare controllers of the following types and quantities:
   1. Air Handlers – one (1) of each type controller
   2. VAV Controllers – two (2)
   3. Fan Powered VAV Controllers – ten (10)
   4. Fan Coil Units – one (1)
   5. Damper Actuators – one (1) of each size/type
   6. Valve Actuators – one (1) of each size/type)

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. The Network Area Controller(s) for this project shall be Tridium JACE(s) utilizing the Niagara 4 framework. No equals shall be accepted for the network area controller or its software. Local

programmable DDC controllers, whether application specific (such as terminal unit controllers) or programmable, shall be BACnet utilizing ASHRAE 135 protocol. Distech Controls is the only acceptable manufacturer of the local DDC controllers and other electric/electronic actuation and controls required for this project. The BAS installation contractor must have at least two Niagara 4 Certified Engineers on staff.

B. Installation shall be by qualified employees or its local authorized representative. Technicians performing the programming, checkout and graphical screen generation of the Network Area Controller(s) and centralized host station shall be Tridium Niagara 4 certified. Certificates of completion of the Niagara 4 Framework Certification Program for Technicians who will perform this work shall be submitted to the Engineer.

2.02 SYSTEM REQUIREMENTS:

A. The system shall be a complete system of automatic temperature regulation of the DDC type with electric and electronic accessories and components as indicated. (The system shall be backwards-compatible with the Owner's existing operating and control systems.)

B. The software shall not require any licensing fees or annual fees. The host must be able to support a minimum of 50 simultaneous users with the ability to expand the system to accommodate an unlimited number of users.

C. All control items except thermostats, sensors and transmitters located in rooms shall be properly identified with engraved plastic nameplates permanently attached.

D. Room thermostat, sensor and transmitter locations shall be coordinated to align vertically or horizontally with adjacent light switches or control instruments. Room thermostats and sensors with setpoint adjustment shall be mounted with bottom 4'-0" above the floor. Room thermostats and sensors without setpoint adjustment shall be mounted with bottom 5'-4" above the floor.

E. All components and materials shall be UL or ASTM rated for use in air plenums.

F. The use of multiplexed inputs is prohibited. Each physical input may not have physical device attached. The use of resistor ladders or other circuits to connect multiple devices to the same input will not be allowed.

2.03 MATERIALS:

A. Sensors, Transmitters and Thermostats:
   1. Temperature sensors for the Direct Digital Control (DDC) System shall be precision RTD's or thermistor. Accuracy shall be plus or minus 1 degree F over the entire control range. Sensors for pipe applications shall be immersion type, provided with pipe well. Sensors for duct application shall be of the averaging type, with a 5 foot or a 22 foot length element. Duct element length shall be adequate to serpentine across the entire duct area. Where sensors are located downstream of fans or at least 10 duct diameters downstream of coils, elbows, junctions, or dampers, single point sensors may be used. Outdoor temperature sensors shall be provided with sunshield of copper or painted aluminum on a northern exposure. Space temperature sensors shall be compatible with unit controller and shall be provided in a decorative metal or plastic enclosure. Sensors located in gymnasiums or multi-purpose rooms shall be provided with heavy-duty wire guards. (Sensors located in public spaces such as corridors and public toilets shall be recessed type with flush mounted stainless steel blanking cover.) (Space sensors shall be provided with set-point adjustment) (and override switch/button.) (Where wireless space sensors are used, battery life shall be 7.5 years or greater with lithium batteries. Sensors shall be provided with lithium batteries.)
   2. Differential pressure transmitters for measuring duct system pressures, shall have an approximate range of no greater than two times the maximum operating pressures of the duct system.
   3. Differential pressure sensors for measuring space static pressure relative to outside static pressure shall have a range of -0.1 to 0.1" w.c. and an accuracy of +1%. The low port shall

be connected to an outside air static sensing probe, such as a Dwyer A-306, designed to mitigate the effects of wind. The high port shall be connected to a tube terminating through the ceiling into the occupied space.

4. Differential pressure transmitters for measuring hydronic system differential pressure shall be Alerton WPR2 or Senva PW30 dual remote sensor type. Each sensor shall be based on a ceramic capacitive sensing element with ¼"-18NPT male fittings. Unit shall be complete with a 5 year warranty.
5. Humidity sensors shall provide a range of 0-100% relative humidity and an accuracy of plus or minus 2% RH from 0 to 93.8% RH at 25 degrees Celsius. Accuracy shall be plus or minus 1% RH within 10% RH of the user setpoint. Operating temperatures shall be from -40 degrees Fahrenheit to +176 degrees Fahrenheit. The unit shall not be damaged when exposed to 100% relative humidity.
6. High temperature thermostat for detection of excessive temperature in the duct shall be U.L. listed, manual reset type with an adjustable temperature setting. Set at 136°F.
7. Low temperature thermostat for detection of low temperature in the duct shall be manual reset type with 20' temperature sensitive element, located downstream from the coil. If any portion of the element senses a temperature below its setting, the contacts shall break. Set at 35°F. Units shall be double pole for connection to the fan starter circuit and for monitoring by the DDC.
8. Electric thermostats shall be line voltage type complete with auto-off switch. The thermostat shall be rated for 6 amps at 120 volts.
9. Remote bulb electric thermostats shall be equipped with a liquid-filled capillary tube 8' long. The electrical rating shall be 10 amps at 120 volts.
10. Surface-mounted aquastats shall have adjustable set point and 10° differential. Contacts shall be rated 10 amps at 120 volts.
11. Sensors mounted in walk-in freezers and coolers shall be BAPI thermobuffer type, model BA/*-TB. Sensors shall be installed in a fluid filled chamber to eliminate temperature spikes. Sensor shall be stainless steel type, 0.4°F accuracy, with a 4" long glycol filled chamber. Glycol shall be the same as specified hereinafter.
12. Flow switches for water shall be McDonnell Miller.
13. Garage door position switches shall be Honeywell 959 XTP Overhead Door Contact. Contact shall permanently affix to both the door and the floor. Contacts shall have a rating of 100mA at 28VDC and use a Form A, SPST, normally closed internal reed switch. Contact shall be rated for use between -40°F and 194°F.
14. Carbon dioxide sensors shall be auto-calibration type with LCD display. Units shall utilize non-dispersive infrared (NDIR) and shall have a range of 0-2000 ppm CO2. Units shall have accuracy of ±3%. Operating range shall be 32°F to 122°F. Outputs shall be 0-10 VDC or 4-20 mA. Unit housings shall be suitable for installation in return air plenums (where applicable) and shall have a standard one (1) year element warranty with lifetime warranty on calibration.
15. Space mounted combination carbon dioxide/relative humidity/temperature sensors. Where the drawings indicate multiple space sensors at a single location, a combination sensor shall be used. The combination sensor shall provide the functions matching the sensor annotations on the drawings. Operating range shall be 32°F to 122°F. Outputs shall be 0-10 VDC or 4-20 mA. Unit shall be provided with a one (1) year warranty.
    a. Temperature accuracy shall be + 1 degree. Sensors shall be provided with set-point adjustment and override switch/button.
    b. Carbon dioxide sensing (where indicated) shall be auto-calibration type with utilizing non-dispersive infrared (NDIR) with gold-plated optical chamber. Range shall be 0-2000 ppm CO2. Units shall have accuracy of ±3%. Field replaceable carbon dioxide element shall be provided with a lifetime warranty on calibration.
    c. Humidity sensors (where indicated) shall provide a range of 10-90% relative humidity and an accuracy of plus or minus 2% RH with an operating range of 0 to 100% RH at 25 degrees Celsius. Field replaceable relative humidity element shall be provided with a one (1) year warranty.

d. (Where wireless space sensors are used, battery life shall be 7.5 years or greater with lithium batteries. Sensors shall be provided with lithium batteries.)

16. Current relays shall be Hawkeye H608 Series or approved equal. Units shall be self-induced powered, solid state electronic with status and power LED's and binary output. Units shall be automatically self adjusting to detect loss-of-load and under current conditions (broken belt, etc.) with a range of 3 to 135 amps. Units shall be suitable for use with variable frequency drives, automatically compensating for changes in frequency and voltage. Operating range shall be 5°F to 185°F. Units shall have a limited five (5) year warranty. Where relays are used on ECM fans less than 1 hp, they shall be Senva ECMSet Pro series or approved equal and have a trip adjustment range of .03 to .50 amps and an amperage range of 0 to 50 amps.
17. Airflow measuring stations
    a. The manufacturer shall have a minimum of ten years experience producing products of this type. Provide products by Ebtron Inc. Alternative manufacturers may be submitted as a substitution in accordance with Division 1 specification requirements. Superior performance or lower cost to the owner must be provided. Acceptance shall be at the sole discretion of the Engineer. In addition to other required warranties provide 3 years on parts from the date of unit shipment. Unless otherwise noted Ebtron model numbers shall be as follows:
        1) Model GTx116-PC for ducts and plenums.
        2) Model GTx116-F for fan inlet applications.
    b. Measurement devices shall consist of one or more sensor probe assemblies and a single, remotely mounted, microprocessor-based transmitter. Each sensor probe assembly shall contain one or more independently wired sensor housings. The airflow and temperature readings, calculated for each sensor housing, shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and arrays are not acceptable. Vortex shedding flow meters are not acceptable. The measuring device shall be UL listed as an entire assembly.
    c. The number of sensor housings provided for ducts and plenums shall be as follows:

Area (Sq. Ft.)	Sensors
<2	4
2 to <4	6
4 to <8	8
8 to <16	12
>16	16

    d. The transmitter shall have a 16 character alpha-numeric display capable of displaying airflow, temperature, system status, configuration settings and diagnostics. Configuration settings and diagnostics shall be accessed through a pushbutton interface on the main circuit board. Airflow shall be field configurable to be displayed as a velocity or a volumetric rate. Transmitter shall:
        1) Independently monitor and average up to 16 individual airflow and temperature readings.
        2) Displaying the airflow and temperature readings of individual sensors on the LCD display.
        3) Have a power switch and operate on 24 VAC (isolation not required), and use a switching power supply fused and protected from transients and power surges.
        4) Have operating temperature range of -20° F to 120° F and be protected from weather and water.
        5) Communicate with the BAS using one of the following options:
            a) Fuse protected and isolated linear field selectable 0- 10VDC and 4-20mA (4-wire) analog output signal.
            b) RS-485: Field selectable BACnet-MS/TP, ModBus-RTU.
            c) Base-T Ethernet: Field selectable BACnet Ethernet, BACnet-IP, ModBus TCP and TCP/IP
            d) LonWorks Free Topology

e. The manufacturer's authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated. A written report shall be submitted to the architect should any measurement location not meet the manufacturer's placement requirements.

18. Water Flow Sensor/Transmitter
    a. The flow sensor shall be an insertion type with a non-magnetic, spinning impeller (paddle wheel) as the only moving part. The sensor sleeve will be brass with the sensor housing being glass-filled PPS. The impeller shall be glass-filled nylon or Tefzel® with a UHMWPE or Tefzel® sleeve bearing. The shaft material shall be tungsten carbide. The flow sensor shall be supplied with a 2" full bore gate valve in brass and a nipple threaded for a 2" NPT connection. A bleed valve and three ethylene-polypropylene O-Rings shall be supplied with the 2" NPT adapter portion of the sensor. A removable installation tool shall be attachable to the sensor for insertion or removal of the flow sensor from the pipe. The sensor will have all electronics epoxy-sealed with a 2-conductor, shielded cable extending out through a ½" conduit connection on the top of the sensor. Insertion of the sensor into any pipe size shall be a fixed 1 ½" depth from the inside wall to the end of the sensor housing. The sensor shall operate in line pressures up to 200 psi and liquid temperatures up to 220° F, and operate in flows of 1 foot per second to 30 feet per second in pipes of 3" diameter up to 40" diameter with linearity of ± 1% and repeatability of ± 1%. This sensor shall be equal to Data Industrial Model 225. The detachable installation tool shall be Model HTT.
    b. The analog flow transmitter shall be a loop powered device capable of transmitting a linear 4 - 20 mA signal proportional to frequency. The unit shall be microprocessor controlled with no switches or potentiometers to set. The transmitter shall meet ISA Class L, H and U non-isolated requirements. All circuitry shall be encapsulated in a 3.65" by 1.50" low profile epoxy body to meet MIL spec M.1-146058C type AR, for humidity, moisture and fungus resistance. Operating range shall be 32° F to 158°F. All programming, including flow sensor selection, pipe size, flow range setting, response time and filtering shall be set digitally via a computer using Windows based software with a programming kit (disk and cable). The transmitter shall be easily programmed in the field using a lap top computer. The transmitter shall have a ground lug to maximize EMI protection when necessary. The transmitter may be mounted directly on any Data Industrial 200 Series insertion flow sensor or up to 500 feet remotely from the sensor, on a DIN Rail, as a panel mount or in a weather proof or NEMA 4X enclosure. The analog transmitter shall be equal to Data Industrial Model 310-00.
    c. Flow meters for the measurement of water associated with the HVAC system (including domestic water makeup to HVAC) shall be Onicon F-1000 series or equal. Provide inline style (F-1134 or F-1101) for all pipes 1" and less, Single Turbine insertion style for pipe 1.25" to 2" (F-1100), and Dual Turbine (F-1200) shall be provided for all pipes 2.5" and greater. Unit shall come complete with D-100 Flow display, or equal, to allow local indication of flow. Provide all accessories required for tie-in to BAS system specified, including any required transmitters, data acquisition devices, and programming.
    d. Flow meters for the measurement of domestic water shall be Sensus Omni C2 Series or Badger Meter Recordall Compound Series Meter. Meters shall consist of a combination of an AWWA Class II turbine meter for measuring high rates of flow and a nutating disc type positive displacement by-pass meter for measuring low rates of flow. An automatic valve shall direct flows through the disc meter at low flow rates and through the turbine meter at high flow rates. At high flow rates, the automatic valve shall also serve to restrict the flow through the disc meter to minimize wear. Meters shall comply with the lead-free requirements as defined by the 2014 provisions of the Safe Drinking Water Act which changes the definition of lead-free from the current 8.0% to not more than a weighted average of 0.25% lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures. A strainer shall be provided for the disc meter. It shall be easily removable and have an effective

straining area of at least double the disc meter inlet. Provide all accessories required for tie-in to BAS system specified, including any required AMI/AMR encoders, transmitters, data acquisition devices, and programming.

19. Gas Flow Meters:
    a. Flow meters for the measurement of gas shall be Onicon F-5500 series or equal. Unit shall be inline (1-1/4" or less) or insertion type (1-1/2" and larger) and utilize direct digital control sensing circuitry to measure thermal mass flow. Ambient temperature range shall be -40°F to 158°F, and shall have a maximum pressure drop of 0.5" W.C. (H2O) in 1-1/2" diameter pipe. Full line size flow conditioner shall be provided upstream of all sensors. Unit shall be provided with both a 4-20mA analog output and a RS485 BACnet MS/TP interface. All wetted components shall be 316 stainless steel.

B. Valves shall be sized by the control manufacturer and shall have threaded connections except valves over 2" which shall have flanged connections. Valve packing shall be U-cup silicone or reinforced Teflon except where indicated. Maximum allowable pressure drop shall be 5 psi for water valves and 60% of inlet steam pressure for steam valves. All valves shall be equipped with positive positioners where indicated.
    1. DDC valve actuators shall be electronic, low voltage modulating type, hydraulic or gear train, with spring return. Actuators shall be sized to provide smooth and positive operation and tight shutoff against full design system pressure. Valves for VAV boxes shall be drive-open, drive-closed type.
    2. (Control valves for the (chilled water) (and) (heating water) system(s) shall be pressure independent actuated ball valves with ultrasonic flow sensor. Basis of design is Belimo ePIV. Actuator provided by controls contractor. Valve shall be sized to allow the maximum flow of the coil being served at a 5 psi pressure differential.)
    3. (Control valves shall bronze globe valve with stainless steel trim, pneumatic actuator with low pressure pilot positioner, proportional, spring return to closed position at steam converter and chilled water cooling coil, and spring return to open position at hot water heating coils. Actuators shall be sized to provide smooth and positive operation and tight shutoff against full design system pressure.)
    4. Valves for steam or heating water service shall be normally open type. Valves for cooling water service shall be normally closed type. Valve bodies 2" and smaller shall be bronze or high grade red brass in sizes 1/2" through 2". Valve bodies 2-1/2" and larger shall be iron.
    5. All modulating valves shall have a minimum rangeability of 25 to 1. Steam control valves shall have linear flow characteristics and water valves shall be equal percentage type. All modulating valves 4" and below shall be globe type. Modulating valves larger than 4" shall be butterfly type. (Modulating valves 2" and smaller may be ball type.)
    6. All valves shall have stainless steel stems with replaceable packing, stem, seats and disk (,ball) or plug.
    7. The pressure characteristics of all valves shall be the same or better than the piping in which installed and shall be suitable for the design system pressures indicated. Valve bodies shall have minimum ratings of 125 psig water service (and 30 psig steam service) unless noted otherwise.
    8. Cooling tower diverting (hot water heating reset mixing) valve shall be Continental, Fisher, or accepted equal, water butterfly valve. Valves and electric (pneumatic) actuator shall be factory mounted and linked on a cast iron "T" ready for installation in the condenser water line.

C. Dampers and Damper Motors:
    1. Control dampers shall be Ruskin Model CD36 low leakage type manufactured specifically to control the air flow in heating, ventilating and air conditioning systems. Frames shall be made of galvanized sheet steel, formed into channels and riveted. In addition to the rigid frame construction, corner brackets shall be used to maintain alignment of the damper. Blades shall consist of formed galvanized sheets, formed for extra strength to withstand high velocities and static pressures. Square or hex blade pins shall be furnished to assure non-slip pivoting of the blades when a damper is used as a single module or is

interconnected with others. Motor operated dampers shall be Class 1A with maximum leakage rate of 4 cfm/ft2 at 1.0 inch water gauge when tested in accordance with AMCA 500D. Maximum blade width shall be 8".

2. Damper actuators shall be provided for all automatic dampers. Damper actuators controlled from the DDC shall be electronic (pneumatic) modulating type, low voltage, spring return and shall be of sufficient capacity to operate the connected damper. Outside air and relief air damper actuators shall be spring return normally closed. Line voltage motors shall be two-position type.

D. Transformers are required for low voltage control items. Control manufacturer shall provide transformers with adequate capacity to operate connected equipment.

E. (Panels: Control cabinets shall be furnished for each a.c. unit, major equipment components and elsewhere as indicated. Control cabinets shall be fabricated of extruded aluminum or steel. The cabinets shall have a face panel for flush mounting gauges, switches, pilot lights, etc. and sub-panel for mounting controllers, relays, etc. Controls which require manual positioning or visual indication shall be flush mounted and identified with engraved nameplates on the face panel. Controls which are required to be accessible only for maintenance and calibration are to be mounted on the sub-panel in the cabinet. Each item shall be identified by engraved nameplates.)

F. Miscellaneous relays, transformers, switches and other devices shall be provided as required for the sequence of control indicated. Relays shall be located adjacent to the controlled device such as motor or motor starter. Relays may be located within starters and equipment control panels where space is available and where approved by NEC. Relays outside of the controlled device shall be provided with NEMA enclosure suitable for location where installed.

G. Disconnect Switches shall be provided for each 120V power connection to Stand-Alone Digital Controllers, Application-Specific Digital Controllers and all other electronic devices provided under this Section.

H. Uninterruptible power supply (UPS) with power conditioning shall be provided for each Building Network Controller and Stand-Alone Digital Controller. UPS power shall be capable of providing a minimum of 15 minutes backup power.

I. Direct Digital Control System:
   1. The Network Area Controller shall be a Tridium JACE (or JACES as required) utilizing the most current release Niagara 4 Framework. No "equals" shall be accepted.
   2. Interoperable BACnet Controller (IBC):
      a. Controls shall be microprocessor based Interoperable BACnet Controllers (IBC) in accordance with the ANSI/ASHRAE Standard 135-2004. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals. The system supplier must provide a PICS document showing the installed systems compliance level to the ANSI/ASHRAE Standard 135-2004, to the Engineer.
      b. The IBCs shall communicate with the NAC via an Ethernet connection at a baud rate of not less than 10Mbps or via the RS485 connection at a baud rate of not less than 38 Kbps.
      c. The IBC sensor shall connect directly to the IBC and shall not utilize any of the I/O points of the controller. The IBC Sensor shall provide a two-wire connection to the controller that is polarity and wire type insensitive. The IBC Sensor shall provide a communications jack for the connection to the BACnet communication trunk to which the IBC controller is connected. The IBC Sensor, the connected controller, and all other devices on the BACnet bus shall be accessible by the POT.
      d. All IBCs shall be fully application programmable and shall at all times maintain their BACnet Level 3 compliance. Controllers offering application selection only (non-programmable), require a 10% spare point capacity to be provided for all applications.

All control sequences within or programmed into the IBC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

e. The Controls Contractor supplying the IBC's shall provide documentation for each device, with the following information at a minimum:
   1) BACnet Device; MAC address, name, type and instance number
   2) BACnet objects; name, type and instance number

3. Network Area Controller:
   a. The network area controller (NAC) shall provide the supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide: calendar functions, scheduling, trending, alarm monitoring and routing, time synchronization, integration of BACnet controller data, network management functions for all BACnet based devices.
   b. The NAC shall support standard web browser access via the intranet/internet. It shall support a minimum of 16 simultaneous users.
   c. The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
   d. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.
   e. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to: to alarm, return to normal, to fault.
   f. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, fire, etc.
   g. Provide timed (schedule) routing of alarms by class, object, group, or node.
   h. Provide alarm generation from binary object "runtime" and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.
   i. Alarms shall be annunciated in any of the following manners as user defined: screen message text, email of the complete alarm message to multiple recipients.
   j. Provide the ability to route and email alarms based on: day of week, time of day, recipient.
   k. Pagers via paging services that initiate a page on receipt of email message.
   l. Graphic with flashing alarm object(s).
   m. Printed message, routed directly to a dedicated alarm printer.
   n. The following shall be recorded by the NAC for each alarm (at a minimum): time and date, location (building, floor, zone, office number, etc.), equipment (air handler #, accessway, etc.), acknowledge time, date, and user who issued acknowledgement.
   o. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.
   p. A log of all alarms shall be maintained by the NAC and/or a server (if configured in the system) and shall be available for review by the user.
   q. Provide a "query" feature to allow review of specific alarms by user defined parameters.
   r. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.
   s. An error log to record invalid property changes or commands shall be provided and available for review by the user.

4. Graphical User Interface (GUI) Software:
   a. Operator workstations must be capable of supporting any BACnet compliant product. The operator shall not be able to distinguish the DDC points from different manufacturers when commanding, monitoring points or acknowledging alarms.
   b. The software shall provide a multi-tasking type environment that allows the user to run several applications simultaneously. The GUI software shall run on a Windows 10 64-bit operating system. The operator shall be able to work in Microsoft Word, Excel, and other Windows based software packages, while concurrently annunciating on-line FMCS alarms and monitoring information. If the software is unable to display several

different types of displays at the same time, the FMCS contractor shall provide at least two operator workstations at each location specified.

c. Color-graphic operator interface: Color-graphic interface shall be driven by software allowing the operator to access any system information via a "system penetration" method. "System penetration" shall allow the operator to begin at an entire site plan color-graphic display and progressively select portions of the site plan to be chosen for closer inspection or selection of a more detailed color-graphic display of a desired portion of the facility. The operator shall be able in this manner to "penetrate" to any desired system information without being required to enter any commands via the keyboard.

d. Dynamic color graphic displays: color graphic floor plan displays and system schematics for each piece of mechanical equipment including air handling units, chilled water systems, hot water systems shall be provided to optimize system performance analysis and speed alarm recognition. All mark numbers for equipment, controller and sensor designations shall exactly match those indicated on the contract drawings. All building and floor plan graphic conceptuals shall be approved by the owner prior to creation of screen graphics. Colorgraphic display shall include, but not be limited to: the real-time value display of any connected point in the network of stand-alone digital controllers, the alarm status condition of any desired system alarm point, any software parameter such as setpoints for control sequences, minimum position adjustments, or throttling ranges.

e. Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, and graphs. Html or xml document links, schedule objects, hyperlinks to other URL’s, and links to other graphic screens.

f. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.

g. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.

h. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.

i. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

j. Commands to start and stop binary objects shall be done by mouse command from the pop-up menu. No entry of text shall be required.

k. Adjustments to analog objects, such as set points, shall be done by mouse command using a graphical slider to adjust the value. No entry of text shall be required.

l. System configuration. At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access: create, delete or modify control strategies, add/delete objects to the system, tune control loops through the adjustment of control loop parameters, enable or disable control strategies, generate hard copy records or control strategies on a printer, select points to be alarmable and define the alarm state, select points to be trended over a period of time and initiate the recording of values automatically.

m. On-line help. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in html format.

n. Security. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators’ access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time

shall be set per operator password. All system security data shall be stored in an encrypted format.

5. Web Browser Clients:
   a. The system shall be capable of supporting an unlimited number of clients using a standard web browser such as Microsoft Edge, Google Chrome, or Mozilla Firefox. Systems requiring additional software (to enable a standard web browser) to be resident on the client machine, or manufacture-specific browsers shall not be acceptable.
   b. The web browser software shall run on any operating system and system configuration that is supported by the web browser. Web page access and control shall be from system network area controllers, not from the workstation. This prevents the problem of no access to web pages if the workstation is turned off.
   c. The web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the graphical user interface. Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted. The browser shall include background refresh software to all real-time updates without use of a refresh button. No additional software shall be required at the remote internet location other than a standard web browser.
   d. The web browser client shall support at a minimum, the following functions: user log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using encryption techniques to prevent unauthorized access shall be implemented.
   e. Graphical screens developed for the GUI shall be the same screens used for the web browser client. Any animated graphical objects supported by the GUI shall be supported by the web browser interface.
   f. Html programming shall not be required to display system graphics or data on a web page. Html editing of the web page shall be allowed if the user desires a specific look or format.
   g. Storage of the graphical screens shall be in the network area controller (NAC), without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
   h. Real-time values displayed on a web page shall update automatically without requiring a manual “refresh” of the web page.
   i. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:
      1) Modify common application objects, such as schedules, calendars, and set points in a graphical manner. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.
      2) Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
      3) View logs and charts.
      4) View and acknowledge alarms.
   j. The system shall provide the capability to specify a user’s (as determined by the log-on user identification) home page. Provide the ability to limit a specific user to just their defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.
   k. Graphic screens on the web browser client shall support hypertext links to other locations on the internet or on intranet sites, by specifying the uniform resource locator (URL) for the desired link.
6. Programmable Equipment Controllers (PEC):
   a. Programmable Equipment Controllers (PEC’s) shall be stand-alone, multi-tasking, real-time digital control processors.

b. The PEC must communicate peer-to-peer with the all of the network configurable and programmable controllers sharing alarming and scheduling information.
c. Programming of the PEC shall be accomplished by using graphical software that incorporates drag and drop capabilities. The PEC software database must be able to execute all of the specified mechanical system controls functions. The programming software shall be able to bundle software logic to simplify control sequencing. All values, which make up the PID output value, shall be readable and modifiable at a workstation or portable service tool. Each input, output, or calculation result shall be capable of being shared/bound with any controller or interface device on the network.
d. PEC's shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
    1) A single process shall be able to incorporate measured or calculated data from and all other PEC's on the network. In addition, a single process shall be able to issue commands to points in any and all other PEC's or Configurable Controllers (CC) on the BACnet network.
    2) Process shall be able to generate operator message and advisories to operator I/O devices.
e. Each PEC shall support firmware upgrades without the need to replace hardware.
f. Each PEC shall continuously perform self-diagnostics, which include communication diagnosis and diagnosis of all components.
g. In the event of the loss of normal power, there shall be an orderly shutdown of all PEC's to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.
    1) Upon restoration of normal power, the PEC shall automatically resume full operation without manual intervention.
    2) All PEC's control programming and databases must be stored in Flash memory, therefore eliminating data loss, downtime and re-load time.
    3) Provide a separate PEC for each major piece of HVAC equipment or system such as chiller plants, air handlers, etc. All system points shall reside on a single controller.

7. Configurable Controllers (CC):
    a. Each Configurable Controller (CC) shall operate as a stand-alone BACnet compliant controller capable of performing its specified control responsibilities independent of other controllers in the network. Each CC shall be a minimum 16-BIT microprocessor based, multi-tasking, multi-user, real time digital control processor.
    b. Flash memory reloads or updating of an existing control algorithm shall be completed over the network.
    c. Network access shall be accomplished at the CC room sensor of the CC. Where applicable; system wide node access shall be available from connecting to the room sensor jack. Systems that do not have a system access jack from the room sensor shall provide a dedicated network jack next to each room sensor.
    d. Controllers shall include all inputs and outputs necessary to perform the specified control sequences. Analog and digital outputs shall be industry standard signals such as 0-10V and 3-point floating control allowing for interface to a variety of industry standard modulating actuators. The CC inputs shall consist of industry standards types such as 10K thermistor, 0-10V, 4-20mA and DI. Inputs shall be electrically isolated from outputs, communications and power. All inputs shall be provided with an auto-calibrate function to eliminate sensing errors.
    e. Each CC shall support firmware upgrades without the need to replace hardware. All controller sequences and operation shall provide closed loop control of the intended application. Closing control loops over the network in not acceptable.
    f. The CC must be mounted remotely from the room sensor. CC's that are wall mounted with integral room sensors are not acceptable.

g. The control program shall reside in the CC. The application program configuration information shall be stored in non-volatile memory with no battery backup.
h. After a power failure the CC must run the control application using the current setpoints and configuration. Reverting to default or factory setpoints are not acceptable.
i. The CC design must support pre-wiring of the hardware components where the electronics are not exposed to the harsh construction phase environment.
j. The CC design must also support an integrated controller/actuator design for the VAV/CV zone level installations where the controller processing and I/O are contained within a single 3point floating actuator housing.
k. Programmable Communicating Thermostat (PCT). Must be available with and without scheduling configuration directly at the thermostat, through the usage of a concealed button or via the network. Must contain two digital inputs, and, depending on the model up to three remote sensor inputs must be available. All models with scheduler must contain a SPST auxiliary switch, which can be used to control lighting or disable the economizer function. The PCT must be capable of communication via native BACnet.

8. Unitary Control Interfaces:
   a. Where unitary controls of packaged equipment are capable of communicating with the specified control system, they may be integrated into the network in lieu of Stand-Alone Digital Controllers, but only if the unitary controller is provided with full software interface documentation. All specified functions and monitoring points shall be provided as specified in the Drawings and/or sequence of operations. Where required control points, monitoring points and full software interface documentation are not provided as part of the unitary controls, DDC control and monitoring shall be provided.
9. Portable Operator Interface (Laptop or Notebook Computer): Provide one portable operator interface for the Owner's use in on-site analysis and control of stand-alone units and network. Unit shall operate on batteries as well as AC line voltage, and shall provide minimum 15.6-inch WLED display with 1920 x 1080 resolution. Unit shall be provided with the latest version of Windows 11 Professional™ operating system, Intel Core i5 processor at 2.2 GHZ or higher, minimum 1.0 TB SATA hard drive, 8 GB of DDR3L SDRAM memory, Ethernet card capable of 10/100/1000 megabits, and an 802.11ax compatible wireless LAN card. Unit shall provide a full size typewriter-style keyboard, with a minimum of eight programmable function keys and thumb pad. Unit shall be provided with a data communications cable for direct connection to the stand-alone control unit or network. Interface ports shall support RJ-11, RJ-45, RS-232, RS-485, or all types as required to interface with specified controllers.
   a. Unit shall have a never expiring fully license copy of all software that is needed to communicate to any control equipment provided for this project. All cables and interface devices that are required to provide communication shall also be provided. Software that does not have a never expiring license will provide a minimum of 5 years of software license and upgrade plan coverage. Niagara 4 workbench shall have the capability to communicate with a minimum of twenty (20) Jace 4 NAC's simultaneously.

J. Control Panels shall be a fully electronic analog control or digital control system, providing all control functions for the equipment specified to be controlled from that panel. Each control panel shall serve one or more equipment systems. Multiple control panels serving a single piece of equipment are prohibited. Each control point shall serve a single, distinct input or output. Control functions to be performed by control panels are as described hereinafter in the sequences of operation and on the drawings. Each panel shall service one or more equipment systems.

K. All signals between the DDC control panel and the monitored or controlled devices shall be low voltage (less than 100 volts).

L. Sensing of temperature, humidity, differential pressure, and all other inputs shall be industry standard signals by one of the following types:

1. 0-20 mA
2. 4-20 mA
3. 0-5 VDC
4. 0-12 VDC
5. Resistance Signals

All inputs shall be compatible with the controllers used, and with the requirements for readout of variables.

M. On/Off Outputs: The control panel shall internally provide test points for the circuit driving the equipment contactor, for troubleshooting the low voltage circuit to the contactor. All relays or digital output modules shall provide a pilot light or LED display of this same status.

N. Modulating Outputs shall be industry standard 0-5 VDC, 0-12 VDC or Milliamp outputs of 0-20 mA or 4-20 mA, or drive open/drive closed type modulating outputs. Drive open/drive closed type controllers shall include sufficient components and control algorithms.

O. Standard Software Function Libraries: Complete libraries of control algorithms for DDC, Energy Management, and Facilities Management functions shall be resident for all stand-alone digital controllers and shall be drawn from for the creation of the application programming.

P. Energy Management Control: The network of stand-alone controllers shall individually perform Time of Day Scheduling, Optimum Start/Stop, Enthalpy Optimization, and all Control Optimization strategies, such as Supply Air Reset, and Soft Start Ramp-up, for their connected systems of equipment. Coordination of strategies involving multiple systems of equipment shall be performed by sharing of necessary data between the stand-alone controllers on the communicating network.

Q. Electric Demand Limiting Control: The stand-alone controllers shall have the capability to communicate and provide coordination for global electric demand limiting control. Demand limiting algorithm shall be resident within a selected stand-alone digital controller and shall issue load shed commands to the network for control of specific items of equipment. Demand limiting shall be sliding window demand control with a minimum of three user definable time of day demand limit setpoints. Multiple load shed tables shall be definable, and be shed for rotational or sequential restoration as appropriate for the loads within each designated shed table. The stand-alone digital controller to which electrical consumption meters may be installed shall provide for daily, and monthly formatted reports of metered electrical consumption. Reports shall be individually named and identified with a title line definable for each report, and shall provide information as detailed as hourly KWH consumption, daily peak hour of consumption, daily time of peak demand, demand setpoint in use at time of peak, daily degree days, and outside air temperature and relative humidity at time of peak. Reports shall be created to provide individual reporting as desired by the Owner for multiple facility meters, multiple sites, or aggregate facility metering combining multiple meters. System shall have capability to designate reports for automatic print, or call-up for report printout on demand, as well as upload to selected centralized host system for historically archiving.

R. Alarm Occurrence Status: Alarm condition reports shall provide a printout listing the status of specific items associated with the equipment generating the alarm. Report shall be routed to a specific printer or combination of printers at the Centralized Host Station or the on-site programming unit. Report shall record time and status information and allow operational personnel to use this information to diagnose the alarm situation.

S. Telecommunications Support: Each building network shall be provided with the necessary equipment, programming, and connections to communicate with remote host computers through one auto dial/auto answer modem and through an Ethernet connection to the Owner's LAN/WAN.

T. Remote Access and Notification: The system shall be installed such that access to the entire facility can be accomplished through both the modem and the Owner's LAN/WAN. The modem and Ethernet connection shall each be capable of providing the following functions:

1. Access to the entire facility control system by the Contractor to provide service and diagnostic support.
2. Access by the Owner from off-site for similar purposes, and for remote operation, monitoring, and adjustment of facility functions.
3. Notification of desired exceptions and alarms to multiple remote sites scheduled as necessary for business hours, or off-hours reporting.

U. Off Hours Exception Reporting shall provide the Owner a means of specifying up to two remote sites for which off hours exceptions shall be reported. Selection of the site to be connected shall be programmed by the Temperature Controls Subcontractor as directed by the Owner, and set to change automatically per time of day and day of week.

V. Generally, the stand-alone digital controller and control panel shall be located on or near the unit, which they control as indicated on the Drawings.

W. Lightning arrestors shall be provided on all wiring, which exists or enters the building. Arrestors shall be located adjacent to the protected equipment.

X. (Control tubing shall be run in a neat and workmanlike manner, of sufficient size, and fastened securely to the building structure. All tubing in finished spaces shall be run concealed. Where exposed in unfinished spaces, tubing shall be run either parallel to or at right angles to the building structure. The piping system shall be tested and made tight under a pressure of 30 psi and leakage shall not exceed 10 psi in 12 hours.

1. Tubing shall be hard drawn copper where exposed and hard or soft drawn copper tubing where concealed. Fittings shall be solder joint type except at final connection to apparatus where brass compression type fittings shall be used.
2. Tubing installed inside panels, unit enclosures and terminal runs to equipment of less than one foot in length shall be single tube type F.R. polyethylene.)

Y. (Current to Pneumatic Transducers:

1. Units shall convert a voltage or current signal from an electronic controller into a pneumatic output pressure signal. Units shall be two-pipe high volume type, with integral potentiometer for field span adjustment, zero adjustment screw and auto-manual switch with separate increase/decrease pushbuttons. Units shall be equipped with inline air filter and field mounting kit.)

Z. As a part of this contract the Temperature Control Subcontractor shall provide forty (twenty four) (sixteen) (eight) hours of classroom instruction in operation, programming and maintenance of the system to owners operating and maintenance personnel. Instructors shall be fully qualified in all aspects of the system. Training shall be scheduled as required by the owner and shall take place at an owner-designated location. Training shall be video recorded and provided to the Owner in DVD format.

PART 3 - EXECUTION

3.01 WORK BY OTHERS:

A. All line voltage wiring (101 volts or more) shall be furnished and installed as a part of Divisions 26 and 27.

B. All low voltage wiring (100 volts or below) shall be furnished and installed as an integral part of this section of the specification in strict accordance with Divisions 26 and 27. (Refer to Divisions 26 and 27 for special requirements of separation between Control and Instrumentation wiring from Communications/Data Cabling.)

C. All dampers, valves, immersion wells and pipe pressure tappings will be installed by the Mechanical Contractor.

D. All relays, firestats, sensors, annunciators, alarms, or other electrical devices not indicated to be installed by Divisions 26 and 27, shall be installed under Division 23. Coordinate with Divisions 26 and 27 for locations as necessary.

E. BAS Contractor shall coordinate the location of all control panels with Divisions 26 and 27. All power circuits and communication network/devices necessary for the control panels shall be provided within the Contract.

3.02 GENERAL SEQUENCE REQUIREMENTS:

A. Refer to Section 23 09 93 for Sequence of Operation for HVAC Controls.

B. Sequences of operation, flow diagrams, and points list are complementary. All control strategies shall be satisfied even if some of the required control points, alarm, or software have been inadvertently left off of the points list or flow diagram. Similarly, control points, alarm, and software strategies indicated on the points list shall be provided even if a written sequence or flow diagram device has been inadvertently omitted.

3.03 INTERFACE WITH PACKAGED UNITARY EQUIPMENT CONTROLLERS:

A. Where packaged equipment is indicated elsewhere within the Contract Documents to provide unitary control with BACNET or similar interface, the DDC shall communicate with and monitor the packaged controllers. Coordinate with available equipment protocols, BACNET MS/TP (or BACNET IP if approved by Owner). At a minimum, the DDC system shall:

1. Provide signals to the packaged controllers for occupancy and all setpoints necessary. Setpoints adjustment shall be available through the graphics interface. Occupancy scheduling shall be as indicated for equipment with DDC control.
2. Monitor all unit alarms and provide an alarm within the BAS of any alarm conditions within the unit. Alarm indications shall be specific to the type alarm occurring with the unit.
3. Monitor all points indicated within this section, all points indicated within the respective equipment specifications and all points shown on the controls schematic Drawings. Additional points shall include monitoring of actual unit percent capacity or stages of capacity where available. Where any control or data point is not provided within the equipment controls, the DDC shall provide the necessary input/output, sensor, etc. necessary for control or monitoring of that point.
4. Provide graphics displays for all packaged equipment to include: all points indicated within this section, all points indicated within the respective packaged equipment specifications, and all points shown on the controls schematic Drawings. The main graphics display for the respective unit shall include all points shown on the controls schematic Drawings. Any data available in excess of that indicated above shall be available outside the main graphics screen.

3.04 INTERFACE WITH VARIABLE FREQUENCY DRIVES

A. Where variable frequency drives are provided, the DDC shall communicate with and monitor the drive. Coordinate with available equipment protocols, BACNET MS/TP (or BACNET IP if approved by Owner). At a minimum, the DDC system shall:

1. Provide speed and start stop signals to the drive.
2. Monitor all unit alarms and provide an alarm within the BAS of any alarm conditions within the unit. Alarm indications shall be specific to the type alarm occurring with the unit.
3. Monitor all points indicated within this section, all points indicated within the respective equipment specifications and all points shown on the controls schematic Drawings.
4. Provide graphics displays for all drives to include: all points indicated within this section, all points indicated within the respective equipment specifications, and all points shown on the controls schematic Drawings. The main graphics display for the respective unit shall include all points shown on the controls schematic Drawings. Any data available in excess of that indicated above shall be available outside the main graphics screen.

3.05 SYSTEM MONITORING AND ALARM

A. The DDC shall provide an alarm for the following points as applicable to each unit, system, or piece of equipment. Where points occur in more than one unit or system, an alarm shall be provided for each system in which it occurs. The alarm indication shall be specific as to the

parameter that has either exceeded or fallen below limits or provides indication that the system is not operating as commanded. The alarm indication shall identify the system in which the alarm occurs. Limits for alarm indication shall be coordinated with the Owner's representative and shall not be so tight as to cause nuisance alarms.

1. Economizer Fault Detection and Diagnostic (FDD) alarms
2. High/low discharge air temperature for all VAV units (adj.)
   Low: Setpoint minus 5°F for a period of greater than 10 min.
   High: Setpoint plus 5°F for a period of greater than 10 min.
3. Return air humidity (adj.)
   Greater than 60% for a period greater than 10 min.
4. Discharge static pressure for all units (exceeds high limit) (setpoint + 0.5") adj.
5. Differential static pressure across filters (0.75") adj.
6. Minimum outside airflow on VAV units
   Below setpoint for a period of greater than 10 min.
7. High return or space CO2 (adj.)
   Greater than 1,200 ppm for a period greater than 10 min.
8. VFD alarm indication
9. Current relays
10. High/low space temperature
    High: 85° adj.
    Low: 45° adj.
11. Duct smoke detectors
12. VAV box low airflow condition (adj.)
    15% below scheduled minimum
13. Differential pressure across fans or pumps (adj.)
    High: Setpoint + 5 psi
    Low: Setpoint – 5 psi
14. Chilled water system supply water temperature (adj.)
    High: Setpoint + 5°F
    Low: Setpoint – 5°F
15. Chiller supply water temperatures (adj.)
    High: Setpoint + 5°F
    Low: Setpoint – 5°F
16. Chiller alarms
17. Low condenser water basin temperature (adj.)
    Below 35°F for greater than 5 min.
18. Boiler alarm(s)
19. Heating water system supply temperature
    High: Setpoint + 5°F
    Low: Setpoint – 5°F
20. Server Room Temperature Alarm (adj.)
    Greater than 80°F
21. Air Handler Freeze Protection (Mixed air temperature < 34°F) adj.
22. Glycol low level
23. Float switch alarms
24. Activation of generator
25. Gas Detection System alarms
26. Kitchen refrigerator temperature alarm
    High: 40° adj.
    Low: 28° adj.
27. Kitchen freezer temperature alarm
    High: 40° adj.
    Low: 18° adj.

3.06 PLACING IN SERVICE AND ACCEPTANCE

A. Prior to final acceptance and authorization for final payment by the Owner, Control System "punch list" inspections shall be made by representatives of the Owner's construction, maintenance, and energy management departments. This is not to preclude that punch lists shall be made by the Contractor to check the completion of his work prior to final "punch lists" inspection. The punch lists inspections shall be in three parts. An inspection shall be performed and punch list (Installation Punch List) prepared regarding the physical installation of the BAS equipment, wiring, etc., and separate punch list shall be prepared regarding the graphics interface (Graphics Punch List); and a third punch list shall be prepared regarding the software programming and systems performance verification at the site (Site Performance Verification Punch List).

1. Graphics Acceptance:
    a. Contractor shall perform self-review of graphics prior to requesting graphics review by Engineer. At a minimum, prior to requesting a Graphics/Programming Punch List inspection, all required "head end" software and graphics at the server shall be installed and functioning; graphics shall be accessible and demonstrated at the school. This work shall be performed prior to building occupancy.
    b. Graphics checklist, provided by Engineer to Contractor shall be completed by Contractor and returned to Engineer indicating that the Graphics are ready for review by Engineer. Engineer will provide review comments to Contractor. Contractor shall acknowledge that any corrective work cited in the review comments has been completed. Engineer will validate Contractor’s response and acknowledge acceptance of Graphics when appropriate.

3.07 MINIMUM DDC GRAPHICS:

A. At a minimum, the following DDC graphics shall be provided. Examples of all utilized graphics shall be sent as a stand-alone submittal for approval. All graphics must align with existing DISD graphics and standards.

1. Floor Pans
    a. Overview of entire building.
    b. Floor plan for each floor.
    c. Zone plan for each zone.
2. All screens
    a. Outside air temperature & humidity
    b. Animations for all active equipment (feedback status, not command)
    c. Add an “Active Alarm” button. This button should access a report that displays all current active alarm messages.
    d. All setpoint adjustments and alarming as defined in the individual equipment sequence of operation specifications shall be incorporated into the graphics package.
    e. All static and dynamic values of all inputs, outputs and setpoints for the area or equipment being displayed.
3. Air Handler Summary Screen with:
    a. Fan Status
    b. Fan Speed
    c. CHW, HW Valve % Command and Position
    d. Electric Heat % Command and Output
    e. OA Damper Position
    f. Discharge Air Temperature
    g. Down-Duct Static Pressure (VAV Units)
    h. Hyperlink to each Air handler full screen
4. Floor Plan Screens
    a. All VAV boxes Color coded by air handler
    b. Hyperlinks to the individual air handlers serving each floor area
    c. Small floor plan of entire building in upper left corner with hyperlink to each individual floor section

5. Each Air Handler Screen
    a. Occupancy Status
    b. Heat/Cool Status
    c. Economizer Status
    d. Dehumidification Status
    e. Outside air Enthalpy
    f. Return air Enthalpy
    g. All Damper Positions
    h. Minimum OA Flow Setpoint
    i. Actual OA Flow
    j. Discharge air temperature setpoint, or Space temperature setpoint
    k. Down-duct pressure setpoint
    l. Fan discharge static reading and setpoint (unless binary switch in which case a tripped condition shall alarm the DDC with specific overpressure indication)
    m. CO2 setpoints
    n. Energy Wheel Animation (Where wheel is present)
    o. List of exhaust fans associated with each system with link to exhaust fan screen
    p. All monitored points
6. Chilled Water System
    a. Outside air wet bulb for water cooled systems
    b. Chiller percent loaded or RLA
    c. Chiller Run status with animation
    d. System Chilled water setpoint
    e. System Condenser Water setpoint
7. All piping pressure setpoints
    a. Outside Air temperature enable setpoint with onscreen adjustment capability.
    b. All monitored points
    c. Link to full BACnet points
8. Heating Water System
    a. Boiler Run Status with Animation
    b. System Heating Water Setpoint with Reset Schedule On Screen
    c. All Piping Pressure Setpoints
    d. Outside Air temperature enable setpoint with onscreen adjustment capability.
    e. All Monitored Points
9. Each VAV Box and Heat pump
    a. Occupancy Status
    b. Heat/Cool Status
    c. % damper open
    d. Min and Max airflow setpoints in both heating and cooling mode.
    e. Space temperature setpoint
    f. Space CO2 if applicable
    g. Color coded to indicate associated AHU system
    h. All monitored Points
10. Exhaust Fan Summary Screen
    a. Status (feedback, not command)
    b. Command
11. Data Rooms
    a. Monitor space temperature only, with alarm

B. Dynamic temperature values, humidity values, air or water flow values and status indication shall be shown in their actual respective locations and shall automatically update to represent current conditions without operator intervention. Setpoints (heating, cooling, humidity, CO2, supply air temp, supply static, differential pressure, etc.), shall be shown in a data block adjacent to the actual displayed dynamic values.

C. All engineering units related to displayed data shall be configured to provide easily understood representations of the equipment operation.

1. Valves and dampers shall have Open % for modulating control and Open/Close for 2-position control
2. Temperatures shall be displayed in ºF
3. Humidity shall be displayed in %RH
4. CO2 levels shall be displayed in PPM
5. Fans, pumps and other motors shall be displayed as On/Off

D. A Menu button located on the overall floor plan graphic should access a Main Menu screen with individual buttons to access the: Special Activity schedules; Chiller; Pumps; AHUs, RTUs, ERUs, Air Terminal Units, Exhaust Fan; etc. Additionally, this main menu should have buttons to access sub-menus for, Reports, Histories, Graphs, etc.

E. From each detailed graphic the operator is to be able to return to the floor plan graphic and menu screen.

F. In addition to the floor plan and mechanical system flow schematics, provide tabular listings of all equipment statuses and space temperature sensors for quick access and review.
1. All temperature, humidity, CO2 values are to be dynamic and change colors for normal, hi or low alarm.
2. The mechanical room group is to list all pertinent chilled water and hot water system equipment statuses and water temperatures. The list is to have a button to access chiller plant and boiler plant schematic flow graphics.
3. Each zone group list shall include the room numbers in sequential order with the room temperature and humidity valves listed. All room numbers are to be hot buttons to directly access the unit or equipment graphic.

G. Graphics portrayed on a screen shall be scaled to fit the screen so that all diagrams and data are viewable without scrolling.

H. On-line notepad: Provide on-line notepad accessible from systems graphic screen. Notepad shall have two functions:
1. Sequence of operations as approved in “As-Built” documents shall be provided. Sequence shall be displayed when notepad is accessed from equipment graphic screen; e.g. when viewing the graphic screen for an air handling unit, clicking on the “Notepad” button will display a “pop-up” window with the text of the sequence of operation pertinent to that AHU. On-screen editing and saving of the sequence shall be possible.
2. Notes, in addition to sequences of operations, may be entered and saved

I. Overridden Points:
1. Overridden points should be highlighted against a yellow background when overridden and a neutral color when not overridden.
2. Provide a school/building specific record of currently overridden points retrievable by operator command.

3.08 INSTALLATION

A. The location of all control items on the exterior of the building shall be approved by the Architect prior to installation.

B. Where the condition occurs, provide insulated sub bases for all space temperature sensors located on exterior walls.

C. All sensors located in equipment, ductwork and piping shall be installed with appropriate fittings such that devices are securely attached to coils, duct, pipe, or similar and are not free to move, rotate, or become dislodged. The use of adhesives for attachment is not permitted.

3.09 TREND REQUIREMENTS

A. A minimum of two (2) complete sets of trends shall be submitted for review. Trends must be delivered to the Engineer and Commissioning Authority at least fourteen (14) days prior to a scheduled on-site performance verification of the facility. Trends shall be submitted illustrating

systems operations when the building is operating in the cooling mode (summer) and the heating mode (winter). The intent of this is to determine whether installed software is functioning and equipment performing as intended.

1. Central plant and global control points must be included in all runs of trends.
2. Trends shall be presented at hourly intervals for a 24 hour period, unless directed otherwise. Systems being monitored shall be operated with an occupancy schedule; i.e. indications that a system was scheduled off for the 24 hours of the trends and remained off are of no value. Occupancy schedules, zone overrides, and all system setpoints (both calculated and manual inputs) shall be provided with the trends and shall be in accordance with SCPS standards and/or directions. Trends shall be submitted with English language point descriptor column header, engineering units provided for each point (e.g. °F, ppm, %RH, CFM, psig, amps, etc.); lengthy point path names as column headers are not acceptable. Print the time and point data information in its respective column for all values for that point. Digital points (commands and statuses) shall be presented as On/Off, Open/Closed (not 0/1); damper, valves shall be trended as % open (not 2-10 or 4-20); temperatures shall be in °F to tenths of a degree.
3. Prior to submitting a set of trends to SCPS, the Contractor shall perform a self review to identify and correct problems. Where trends indicate problems, discrepancies, and/or deficiencies and the Contractor has performed corrections, partial trends may be submitted as addenda or inserts with the original set of complete building trends indicating that the problem has been corrected. For example, if the complete set of building trends largely indicates that the control system functions properly, but an air handling unit was not running when commanded on; an addendum or insert trend for this air handling unit may be provided with the original complete set that indicates proper operations after the unit was made to run. All global and central plant points shall be included for the time period of the addendum trends. Include contractor review comments with trends submission.
4. To assure that trends suitably demonstrate appropriate operations, heating trends shall be run when outdoor air drops to an occurrence of at least 35°F during the trend period, cooling season trends can be run whenever outdoor air rises to an occurrence of at least 85°F during the trend period.
5. Predicated upon the discrepancies discerned by the engineer’s review of trends, subsequent complete or partial trends may be required.
6. The following constitutes those items that, at a minimum and as applicable, shall be included in a trend submittal:
    a. Outdoor air: Drybulb temperature (wall and roof locations), humidity, CO2, enthalpy.
    b. Phase, Voltage: Trends should indicate time and duration of any occurrence of power interruption and normal power resumption.
    c. Incoming Power: Kw, Kwh
    d. Overrides: Run status
7. Chilled Water System:
    a. Supply/Return water temperature chiller
    b. Flow (GPM)
    c. Pumps commands, status, speed, system pressure
    d. Chiller command, status, alarm
8. Incremental Units (FCUs and CUHs)
    a. Space temperature actual and setpoint
    b. Supply air temperature
    c. Supply fan command and status
    d. Heating command
    e. Cooling valve command (FCU only)
    f. Condensate overflow alarm
9. Rooftop Units (as applicable)
    a. Occupied/unoccupied command
    b. OA CFM
    c. Supply and exhaust fan statuses, exhaust fan speed
    d. Alarm status

e. Outdoor air temperature, humidity, & dewpoint
f. All unit temperatures
g. All unit humidities
h. Space temperature, humidity, CO2, static pressure
i. Controlling setpoint (supply, space or effective temperature and/or humidity)
j. All damper positions
k. Recovery wheel command
l. Operating mode (occ/unocc, econ, dehumid, etc.)
m. Condensate overflow alarm

10. VAV terminals
    a. Space or discharge (controlling) temperature
    b. Valve position
    c. CFM
    d. Discharge air temperature
    e. Fan status
11. Split AC units – Monitored space temperature
12. Exhaust Fans (where BAS controlled and/or monitored):
    a. Scheduled run/enabled status
    b. Actual run status or enabled status

3.10 SERVICE AND GUARANTEE

A. The entire control system shall be serviced and maintained in first class condition by the control manufacturer for a period of one year after acceptance at no extra cost to the Owner.

END OF SECTION

SECTION 23 0993

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

B. Work Included:

1. Sequence of Operations for HVAC Systems

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 05 53 – Identification for HVAC Piping and Equipment
5. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
6. Section 23 09 00 – Instrumentation and Control for HVAC
7. Section 23 20 00 – HVAC Piping and Pumps
8. Section 23 30 00 – HVAC Air Distribution
9. Section 23 80 00 – Decentralized HVAC Equipment

1.02 GENERAL REQUIREMENTS

A. Programming shall be provided in accordance with commonly accepted industry standards and practices to ensure proper and efficient control of all equipment and systems.

B. Control sequences shall be accomplished in accordance with control drawings and the sequences specified in this section and described on the drawings. It is the intent of this section to utilize sequences included in pre-programmed controllers when such sequences provide the intended operation. Where factory programming is incapable of providing the sequence specified in the Contract Documents, a custom controller with custom programming shall be provided.

1.03 SUBMITTALS

A. Refer to Section 23 09 00, Instrumentation and Control for HVAC.

1.04 WARRANTY

A. Refer to Section 23 09 00, Instrumentation and Control for HVAC.

1.05 COMMISSIONING OF HVAC SYSTEMS:

A. Refer to Section 23 09 00, Instrumentation and Control for HVAC.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 GENERAL SEQUENCE REQUIREMENTS:

A. Set points: All control setpoints shall be provided with appropriate deadbands where necessary to prevent the excessive cycling of equipment, valves, dampers, etc.

B. Failure of Digital Control System: The control system shall be installed to fail safe to the heating mode.

1. All air handling and air conditioning units shall fail on with outside air damper closed, heating valves open to the coil and the reset valve open to the boilers.
2. Night setback shall fail to day (occupied) mode.
3. Heating water system shall fail with boiler energized to boiler control and heating water pump on.
4. All interlocked exhaust fans shall be de-energized with the dampers closed.

C. Unoccupied Period Freeze Protection: When outdoor air temperature falls below 35°F during unoccupied periods, the following sequence shall occur.
1. Heating (and chilled) water pumps shall be energized (pumps should be energized whenever any space requires heat).
2. All air unit heating (and cooling) valves shall be fully open when the fan is off.
3. All outdoor air dampers shall be closed and verified.
4. All exhaust fans shall be de-energized with dampers closed (should already be de-energized during unoccupied periods).

D. Unoccupied Periods: At times when the building is unoccupied, the DDC shall control all systems to maintain an adjustable night setting for both heating and cooling. Unless otherwise specified, all outside air dampers shall be closed and all exhaust fans shall be de-energized. Where fan powered VAV boxes are utilized, night heating shall be performed as required by the individual terminal units without energizing the associated air handling units. Terminal units such as cabinet unit heaters and fan coil units shall cycle the fans as necessary to maintain unoccupied setpoints. The DDC shall stagger the occupied/unoccupied schedules for all air handling units to prevent large fluctuations in heating or cooling demand. Activation of the manual override on a space temperature sensor, where applicable, shall result in the following: the space temperature setpoint shall be indexed to the occupied setpoint for that space and the system serving that space shall be indexed to the occupied mode. All other spaces shall be maintained at unoccupied temperature setpoints.

E. Morning Warm-up: All air systems shall bring space up to occupied temperature before opening outside air dampers as part of the optimal start sequence.

F. System Start-up: Following any type of system shutdown, the DDC shall stagger the starting of all electrical loads to reduce electric peak demand.

G. System Shut-down: At any time air systems are de-energized, the DDC shall disable all ancillary systems dependent upon air movement such as electric heaters, humidifiers and direct expansion cooling. Ancillary systems required for freeze protection (except electric coils) shall remain operational.

H. Direct Expansion (DX) Cooling: Where the Sequence of Operation calls for DDC control of refrigeration compressors, condensing units or packaged compressor-cooling, the DDC shall provide “minimum-on” and “minimum-off” times in accordance with the equipment manufacturer’s recommendations.

I. Duty/Standby and Lead/Lag Control: All equipment indicated to be operated as duty/standby or lead/lag shall be sequenced based on run time and alternated bi-monthly or as otherwise required in accordance with the Owner’s preferred schedule. Sequencing shall occur as scheduled without the need for shutdown, if necessary. Sequencing for individual equipment shall occur so as not to impact the operation of the entire system. The DDC shall automatically energize the standby or lag device in the event of a failure in the duty or lead equipment.

J. Smoke Detection Control: Upon activation of an air handling unit duct smoke detector, all fan powered VAV boxes associated with that unit shall be deenergized.

K. Refer to the Electric Sequence Controls Schematics on the drawings for automatic control of fans, ancillary heating equipment, and other similar items. The following hard-wired interlocks shall be provided in addition to any others indicated on the Electric Sequence Controls Schematics:

1. Activation of kitchen hood suppression system as sensed by the suppression system microswitch shall energize the kitchen hood exhaust fan and de-energize the kitchen hood make-up air unit (where applicable).
2. Boiler firing shall be inhibited unless combustion air dampers have been opened and verified open through actuator limit switches.
3. Emergency boiler shutoff shall de-energize all boilers upon activation of the emergency break glass switch provided under Division 26.
4. Activation of duct smoke detectors shall de-energize associated supply fans and return/relief fans (where applicable).
5. Where refrigerant machines are installed in the same room as fuel fired devices, the detection of a refrigerant leak, as sensed by the refrigerant monitor, shall prevent and terminate the firing of all fuel fired appliances.
6. Where refrigerant machines utilizing an A2L refrigerant are installed in a room, the detection of a refrigerant leak shall signal an alarm and activate the ventilation system.
7. Low air flow condition indicated by the air flow switch shall prevent the operation of electric heating coils.
8. Cooling coil condensate drain pans shall be provided with safety switches to de-energize the unit and alarm the DDC upon accumulation of water.

L. All screen graphics for systems with economizers shall show calculated values of enthalpy for outdoor air and return air.

3.02 SEQUENCE OF OPERATION:

A. Refer to Drawings for Sequences of Operation

END OF SECTION

SECTION 23 2000

HVAC PIPING AND PUMPS

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Pipe and Pipe Fittings
2. Miscellaneous Piping Specialties

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 05 48 – Vibration and Seismic Controls for HVAC Equipment and Piping
5. Section 23 05 53 – Identification for HVAC Piping and Equipment
6. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
7. Section 23 09 00 – Instrumentation and Control for HVAC
8. Section 23 80 00 – Decentralized HVAC Equipment

1.02 REFERENCES:

A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.

B. American Society for Testing and Materials (ASTM):

A53-88a Pipe, Steel, Black and Hot-dipped, Zinc-coated, Welded and Seamless

A106-88a Seamless Carbon Steel Pipe for High Temperature Service

A120-88a Pipe, Steel Black and Hot-dipped, Zinc-coated, Welded and Seamless for Ordinary Uses

A126-84 Gray Iron Castings for Valves, Flanges and Pipe Fittings

A254-88 Copper Brazed Steel Tubing

A420-88 Piping Fittings of Wrought Iron Carbon Steel and Alloy Steel for Low Temperature Service

A539-88 Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines

B32-89 Solder Metal

B42-88 Seamless Copper Pipe, Standard Sizes

B75-86 Seamless Copper Tube

B88-95a Seamless Copper Water Tube

D4101 Polypropylene Injection and Extrusion Materials

F2389 Standard Specification for Pressure Rated Polypropylene (PP) Piping Systems

F3722 Standard Practice for Heat Fusion Joining of Polypropylene Pipe and Fittings

C. American Society of Mechanical Engineers (ASME):

ASME 95 Boiler and Pressure Vessel Code

B16.3 Malleable Iron Threaded Fittings

B16.4 Cast Iron Threaded Fittings

B31.9 Building Services Piping

D. International Ground Source Heat Pump Association (IGSHPA) Installation Manuals.

E. National Electrical Manufacturers Association (NEMA)

F. Underwriters Laboratories, Inc. (UL)

1.03 COMMISSIONING OF HVAC SYSTEMS:

A. The Contractor shall provide contact information to the Commissioning Agent indicated in Division 1 for all major items of Equipment.

B. Provide additional submittal copy of major equipment for Commissioning Agent specified in Division 1.

1.04 SUBMITTALS:

A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.

B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.

C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 00 10.

D. IGSHPA Installation Manuals: Submit one copy of each manual to the Engineer.

E. Equipment:

1. All equipment furnished to complete the work shall be in good operating condition and capable of safely and efficiently performing the work required in a timely fashion. The Contractor shall provide qualified operating personnel for the operation of this equipment.
2. The Contractor shall furnish and install at the Contractor's own expense, all fuel, oil, hydraulic fluid, grease, cable, repair parts, including worn or broken tools, and all other supplies, bits and parts or personnel necessary for the efficient operation of each piece of equipment.

F. Permits, Laws and Regulations:

1. The Contractor shall procure and pay for all permits, licenses, inspections, or approvals necessary for the execution of the contract.
2. The Contractor shall comply with all laws, ordinances, rules, orders, and regulations relating to the performance of the work, the protection of property, the maintaining of surface passageways to buildings, fences, and/or other facilities.
3. All applicable Federal and State laws and regulations, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over the project shall apply to the contractor throughout and they shall be deemed to be included in the contract as a part, therefore, the same as though herein written out in full.
4. All regulations of the Occupational Safety and Health Act are in effect on this contract. It will be the Contractor's responsibility to make himself aware of all appropriate County, State and Federal regulations that apply to this contract.
5. Any violations incurred from improper execution of the above shall be paid by the Contractor. Loss of time on the project from such violations will not be tolerated.

G. Water Supply:

1. The Contractor shall supply potable water as necessary to perform the work. The equipment will include pumps, water trucks or trailers, storage tanks and all other items

necessary to provide an adequate supply of potable water. The source shall be subject to approval of the Engineer.

H. Project Conditions:
   1. Protection: During test work, protect controls, gages and accessories which are not designed to withstand test procedures. Do not utilize permanently installed gages for field testing of systems.

I. Sequencing and Scheduling:
   1. Transmit written notification of proposed date and time of operational tests to the Owner's representative at least 5 days in advance of such tests.
   2. Perform cleaning and testing work in the presence of the Owner's representative.

J. Warranty:
   1. Manufacturer's Warranty: Minimum 25-year warranty for polyethylene piping. Special Warranty: 25 years for butt fusion welds in polyethylene piping against leakage.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS:

A. Material Standards:
   1. Steel pipe shall be manufactured in accordance with ASTM A53 and shall be so labeled.
   2. Copper pipe shall be manufactured in accordance with ASTM B88 and shall be so labeled.
   3. HDPE pipe shall be manufactured in accordance with AWWA and shall be so labeled.
   4. Polypropylene (PP) pipe shall be manufactured in accordance with ASTM F2389 and shall be so labeled.

B. Refrigerant piping shall larger than ¾" shall be type "ACR" hard drawn copper tubing, pipe ¾" and smaller shall be soft copper refrigerant tube. Pipes shall be factory cleaned, dehydrated and capped with wrought copper fittings. Provide all accessories including, but not limited to, refrigerant duty ball type shutoff valves, solenoid valves, expansion valves, moisture indicating sight glass, replaceable core filter dryers, access ports with gasketed screw-on covers for charging and measuring subcooling, hot gas bypass valve (where indicated) and other accessories recommended by the refrigeration equipment manufacturer. Expansion valves shall be balanced port, externally equalized type. Provide heat exchangers for subcooling and suction line accumulator as recommended by the manufacturer. All components shall be selected and sized for the lowest pressure drop at the capacities indicated. Prior to offering the system for final acceptance, the Contractor shall submit a written certification from an authorized official of the equipment manufacturer stating the complete system, to include refrigerant piping, has been installed in accordance with the manufacturer's recommendations.

C. Provide utility location tape 12 inches to 24 inches above buried piping outside the building, consisting of polyethylene plastic and metallic core or metallic-faced, acid-and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording.
   1. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
   2. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.02 MISCELLANEOUS PIPING SPECIALTIES:

A. Dielectric fittings such as couplings or flanges shall be installed to isolate pipes of non-ferrous metal where connection is made to ferrous metal. Isolation shall be accomplished by use of a brass converter fitting of threaded brass or bronze couplings (not unions), or flanged joints with gaskets and bolt bushings. Materials shall withstand pressure and temperature as required. Valves of the same materials may also be used.

B. Drains shall be accessible and shall consist of 3/4" ball valves with hose thread adapters, cap and chain unless indicated otherwise.

C. Escutcheons shall be the split pattern chromium plated bronze or steel. Special height escutcheons shall be provided where extended sleeves are used. Escutcheons shall be sized to cover the entire opening.

D. Water seals (Trap) shall be provided on condensate drain from each air handling unit. Seal shall be of sufficient depth to prevent blowout or siphoning of water and shall be configured as indicated on the Drawings. Where drains are installed concealed within the building construction, a label shall be provided at the termination point indicating if the drain is from a primary or secondary drain. The label shall be located within three feet of the termination. Where piping is concealed within walls or behind hard ceilings, shield plates shall be installed between the pipe and the finished face of the framing members to prevent damage from nails or screws.

E. Pipe sleeves shall be installed as outlined in SECTION 23 00 10 HVAC GENERAL REQUIREMENTS.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION:

A. General: Sleeves and sealant shall be provided where pipes pass through floors, partitions or walls as outlined in Section 23 00 10, HVAC GENERAL REQUIREMENTS. Pipe shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, properly clearing all windows, doors and other openings. Pipe in finished areas shall be concealed. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted. Each end of each piece of pipe shall be reamed. Pipe shall be installed to permit free expansion and contraction without damage to joints or hangers. Changes in direction shall be made with fittings(, except that bending of pipe will be permitted provided a hydraulic or mechanical bender is used and wide sweep bends are formed.) (Bent pipe showing kinks, wrinkles, or other malformations will not be acceptable). Bushings and all thread nipples will not be allowed.

B. All piping shall be installed with sufficient pitch to insure adequate drainage and all high points in water lines shall be provided with (auto-air) (manual-air) vents, all low points with drains. (Steam and condensate lines shall slope a minimum of 1 inch in 40 feet in direction of flow unless indicated otherwise. Low points in steam lines and points at the end of a pipe run shall be provided with drip stations. Pipe size changes in steam lines shall be made with eccentric reducers with outlet on bottom. Branches from steam mains shall take off from the top of the main.) Cooling coil condensate drain lines shall slope 1/8" per foot in direction of flow. (Pipe extending through the roof shall be properly flashed.)

C. Bull head tee piping connections shall not be used in supply or return arrangements.

D. Piping connections to equipment shall be provided with unions or flanges. Banked water coils shall be piped in reverse return arrangement with a balancing cock in the return leg of each coil. (Steam coils shall be trapped individually.) (Vacuum breaker shall be provided at steam supply connection to each steam coil or steam bundle.) Boilers shall not be connected into the piping systems until they have been thoroughly cleaned internally in accordance with the manufacturer's instructions and not until they can be fired under a fairly continuous load.

Connections shall not be made to any equipment until the piping systems have been cleaned completely and are free of all dirt.

E. A suction diffuser shall be provided at the suction connection to each base mounted pump; maximum water pressure drop shall not exceed 2.5 feet w.g. at full pump flow. Suction diffusers shall have start-up screen.

F. Open ends of pipe lines or equipment shall be properly capped or plugged during installation to keep dirt or foreign material out of the system.

G. Escutcheons shall be provided where exposed pipes pass through finished walls or floors.

H. Miscellaneous piping terminating at floor drains or in the air shall be resiliently anchored to protect against fatigue or damage incurred as a result of vibration or abuse.

I. Provide P/T ports in the supply and return piping at all coils, heat exchangers, pumps, and where otherwise indicated on the drawings.

J. All piping to a coil or heat exchanger shall be the full size of the runout indicated with a reducer as necessary at the coil connection. This shall include all appurtenances except control valves.

K. All underground piping shall be installed minimum 3'-0" below grade and minimum 4'-0" below roadways unless otherwise indicated on the Drawings.

L. Grooved pipe fittings shall not be allowed on this project.

M. Joints:

1. Copper tubing shall be cut square, ends reamed and all filings and dust wiped from interior of pipe. Joints shall be soldered with solder drawn through the full fitting length. Excess solder shall be wiped from joint before solder hardens. Solder shall be 95/5 composition – 50/50 will not be allowed. All solder joints shall have piping surfaces sanded or brushed. Self-cleaning solder flux as a substitute for sanding or brushing is not acceptable. In lieu of soldered fittings in hydronic piping, Viega ProPress (no substitute) fittings may be used for copper pipe 2" and smaller.
2. Threaded joints shall be made with tapered threads properly cut. Joints shall be made tight with a stiff mixture of litharge and glycerin or other approved thread joint compound applied with a brush to the male threads only. Not more than three threads shall show after the joint is made up. The use of thread protectors for pipe couplings is not acceptable. Expanding self-hardening pipe dope ("expando") shall not be used.
3. Welded Joints:
    a. Welded joints shall be fusion-welded by qualified welders in accordance with American National Standard B31.1.06, Chapter 5, unless otherwise required. Changes in direction of piping shall be made with welding fittings only. Mitering or notching pipe to form elbows and tees or other similar type construction will not be permitted. The contractor shall wire brush and paint welded pipe welds before insulation is applied. (Saddle type welding outlets may be used for equipment take-off's from the mains.)
    b. All pipe welding shall be done only by competent and experienced welders. High test welding rods suitable for the material to be welded are to be used throughout. All welds shall be built up to a thickness of 1 ½ times pipe wall thickness. All tees, branches, reducers or specialties that may be required in welded piping shall be carefully laid out by welders, using templates, and the joints shall have carefully matched intersections and shall be properly spaced. Finished pass on all welds shall be a smooth continuous weld cap. Multiple "stringers" on horizontal welds will not be acceptable.
    c. During welding, all piping shall be securely clamped in place so that true alignment is held throughout the welding process. Where there is apt to be distortion, proper allowance shall be made so that the sections to be joined will be in proper alignment after the weld is completed. Care shall be exercised to prevent the occurrence of

protruded metal into the pipe. All welds shall be of sound metal, free from laps, cold shuts, gas pockets, oxide inclusions and similar defects.

d. Adequate protection blankets, screens, etc. shall be provided during cutting and welding to protect existing adjacent surfaces.

4. Flanges and unions shall be faced true and made square and tight. Unions shall be (125) (300) psi service, bronze seat type. Flanges shall be ASA Standard 125 psi service with red rubber gaskets (150 psi service with high temperature gaskets). Unions or flange joints shall be provided on each side of each valve 2-1/2" or larger and in each line immediately preceding the connection to each major piece of equipment such as a (pump,) (converter,) (cooling tower,) (boiler,) (chiller,) (condenser,) (heating coil,) (cooling coil) and other similar items.

3.02 REFRIGERANT PIPING:

A. All refrigerant piping shall be sized, installed, and routed in accordance with the refrigeration equipment manufacturer's recommendations.

B. All piping joints and the inside of all piping shall be clean. Burnish all mating surfaces until all dirt, oxide, or other debris is removed. Using no flux, braze all joints using hard solder equal to Stay-Bright for pipe 2 inches and below or Stay-Silver for pipe larger than 2 inches. Remove all internal components from refrigerant accessories which may be subject to heat damage prior to brazing. Joints for copper tubing for ductless split systems smaller than ¾" may be flared fittings.

C. Before charging, refrigerant lines shall be thoroughly cleaned and purged. Refrigerant lines shall be pulled down to a vacuum of 500 microns and then pressure tested according to the manufacturer's instructions before charging with refrigerant.

D. All filters from filter dryers shall be replaced after 48 hours of system operation and prior to final acceptance.

E. Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper resistant caps or shall be otherwise secured to prevent unauthorized access.

F. Exposed refrigerant pipe installed in open spaces that afford passage shall be not less than 7' - 6" above the finished floor.

G. Where piping used in A2L or B2l systems is located in concealed locations such as in studs, rafters, joists, or similar member spaces, and located less than 1.5" from the nearest edge of the member, piping shall be continuously protected by shield plates in accordance with Code. Plates shall be made of steel, minimum 16 gauge, and shall cover the area of the tube plus the area extending not less than 2" beyond both sides of the piping.

H. Stop valves shall be provided and installed in all refrigerant piping systems that contain more the 6.6 pounds of refrigerant. Stop valves shall be installed at the suction inlet of each compressor, compressor unit, or condensing unit, as well as the discharge outlet of each compressor, compressor unit, or condensing unit, and the outlet of each liquid receiver. Stop valves shall be identified as required by Code.

I. The Contractor shall issue a certificate of test to the Engineer and AHJ for all systems containing 55 pounds or more of refrigerant. The certificate shall give the test date, name of the refrigerant, test medium and the field test pressure applied to the high-pressure side and the low-pressure side of the system. The certification of test shall be signed by the Contractor and shall be made part of the public record.

3.03 CONTROL ACCESSORIES:

A. Control valves, pipe wells and pressure tappings shall be furnished under Section 23 09 00 and installed as work of this Section.

END OF SECTION

SECTION 23 3000

HVAC AIR DISTRIBUTION

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. HVAC Ductwork
2. Air Duct Accessories
3. HVAC Fans
4. Special Exhaust Systems
5. Air Terminal Units
6. Air Outlets and Inlets
7. Wall Louvers
8. Brick Vents
9. Roof Vents
10. Ventilation Hoods

C. Related Sections:

1. Section 01 91 13 -- General Commissioning Requirements
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 05 48 – Vibration and Seismic Controls for HVAC Equipment and Piping
5. Section 23 05 53 – Identification for HVAC Piping and Equipment
6. Section 23 07 00 – HVAC Insulation
7. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
8. Section 23 09 00 – Instrumentation and Control for HVAC
9. Section 23 80 00 – Decentralized HVAC Equipment

1.02 REFERENCES:

A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.

B. Air Movement and Comfort Association (AMCA):

Bulletin 210, Standard Test Code for Air Moving Devices

Standard 511, Air Performance and Water Penetration

C. American Society for Testing and Materials (ASTM):

ASTM A 525 General Requirements for Steel Sheet, Zinc Coated (Galvanized) By the Hot-Dip Process

ASTM A 527 Steel Sheet, Zinc Coated (Galvanized) By the Hot-Dip Process, Lock-Forming Quality

ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM C 411 Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

D. Underwriters Laboratories, Inc. (UL)

Standard 723 Tests for Surface Burning Characteristics of Building Materials

E. Sheet Metal and Air Conditioning Contractors' Association (SMACNA)

Duct Construction Standards (Latest Edition)

HVAC Air Duct Leakage Test Manual (Latest Edition)

F. National Fire Protection Association (NFPA):
   1. Standard 90A – Standard for the Installation of Air Conditioning and Ventilating Systems
   2. Standard 90B – Standard for the installation of Warm Air Heating and Air Conditioning Systems
   3. Standard 96 – Standard for the Installation of Equipment for the Removal of Smoke and Grease – Laden Vapors from Commercial Cooking Equipment
   4. Standard 255 – Method of Test of Surface Burning Characteristics of Building Materials

1.03 DEFINITIONS:

A. Duct Sizes: Sizes shown on Drawings are actual sheet metal dimensions. For acoustically lined ducts, sizes indicated are actual sheet metal sizes allowing for 1" thick acoustic lining. For double wall ductwork, sizes indicated are inside dimensions.

B. Low Pressure Ductwork: Static pressure rating less than 2" w.g. and velocities less than 2000 fpm.

C. Medium Pressure Ductwork: Static pressure rating less than 6" w.g. and velocities greater than 2000 fpm and all ductwork upstream of VAV boxes.

D. High Pressure Ductwork: Static pressure rating over 6" w.g. and velocities greater than 2000 fpm.

1.04 COMMISSIONING OF HVAC SYSTEMS:

A. The Contractor shall provide contact information to the Commissioning Agent indicated in Division 1 for all major items of Equipment.

B. Provide additional submittal copy of major equipment for Commissioning Agent specified in Division 1.

1.05 SUBMITTALS:

A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.

B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.

C. Operation and maintenance data shall be submitted in accordance with Division1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.

D. All fans for use with Variable Frequency Drives (VFD) shall have critical speed and multiples of critical speed indicated on each submittal.

1.06 SPARE PARTS

A. Each fan powered terminal box and make-up air fan shall be provided with 3 sets of filters. At end of construction each unit shall be provided with a clean filter and one set shall be turned over to the Owner as spares.

B. Each filter grille shall be provided with 3 sets of filters. At end of construction each unit shall be provided with a clean filter and one set shall be turned over to the Owner as spares.

C. Each belt driven piece of equipment shall be provided with one spare set of belts to be turned over to the Owner at the end of construction.

PART 2 - PRODUCTS

2.01 HVAC DUCTWORK

A. Materials:

1. Sheet Metal Ducts: Trademarked galvanized steel, lock forming quality, having zinc coating of 0.90 ounces per square foot for each side (G90, ASTM A653 and A653M).
2. All ductwork without external insulation, exposed to view in finished, non-utility spaces shall have paint-grip or galvaneal coating to accept field painting.
3. Fasteners: Use rivets and bolts throughout; sheet metal screws may be used on low pressure ducts.
4. Sealants: United McGill “United Duct Sealer” or equal. Water and fire resistant when dry, compatible with mating materials. Where sealants are used on exposed ductwork, composition shall be designed to prevent bleed-through of finish paint, or sealant shall be pre-painted with a coating impervious to bleed-through.
5. All duct and accessory materials shall have a composite flame spread rating not exceeding 25, and a smoke developed rating not exceeding 50 as tested under procedure ASTM E-84-75, NFPA 255 and UL 723. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411.
6. (Fibrous Glass Ducts: 1 inch thick rigid fibrous glass with aluminum foil, glass scrim and kraft paper jacket vapor barrier, 0.23 btu/in./sq.ft./°F./hr. maximum “K” value at 75°F.)
7. (PVC Ducts: Rectangular duct will be formed from Type I Grade I PVC extruded sheet material. Corners will be heat bent and seams thermal fused where applicable. Where heat bending and thermal fusion is not possible, corner welding with PVC filler rod will be utilized. Where the developed length is 120" or less, 3/16" material will be used. Above 120", 1/4 sheet will be used. Both 45° and 90° elbows will be 2 pieces, square throat. The 90° elbows will have turning vanes made from PVC extruded duct material. Transitions will be tapered and will be the same material thickness as the duct. They will be concentric unless otherwise noted. Branches will enter main run at 45° angle only unless otherwise specified. Couplings will be sleeve type only. Overall length is 6" and will be the same thickness as the duct. Flanges for 3/16" wall duct will be 1-1/2" x 3/16" PVC Type I angle. Flanges for 1/4" wall duct, 2" x 1/4" Type I PVC angle will be used. Bolt holes will be 5/16" diameter on approximate 4" centers. Bolting, gaskets and flexible connections will be the same as the round duct standards. End caps and access panels will be the same as the round duct standards. Reinforcement, if required, will be per SMACNA Fourth Edition, 2020, for the particular water gauge specified. Joining can also be accomplished with the bell (coupling) and spigot method, flanging or field welding.)

B. Fabrication:

1. All ductwork shall conform accurately to the dimensions indicated on plans and shall be fabricated and installed in accordance with ASHRAE Guide and Data Books and SMACNA Duct Construction Standards, except that sheet metal gauges and zinc coating shall not be lighter than specified under this Section.
2. All rectangular sheet metal ducts over 18” wide shall be cross-broken for rigidity.
3. Reinforcing angles, stiffeners and tie-rods for all sheet metal ducts shall be provided where required to prevent sagging, buckling, and vibration in accordance with the latest SMACNA Duct Construction Standards Publication. Reinforcing for flat oval duct shall be provided as specified for rectangular duct in accordance with the latest SMACNA Duct Construction Standards Publication.
4. Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth interior surface.
5. Where square elbows are indicated on the Drawings, curved elbows may be used provided the centerline radius is not less than 1-1/2 times the width of duct and as space allows.
6. Provide turning vanes in all square elbows. Provide air foil type turning vanes on all ducts more than 24” wide. Mitered round elbows (2-piece) shall not be used unless specifically indicated. Mitered round elbows shall have airfoil turning vanes.

7. Transitions shall be made with a slope ratio of 4:1, except at equipment divergence and convergence shall not exceed a slope ratio of 3:1.
8. All duct joints and seams shall be mechanically tight, and sealed with sealant or gaskets to provide a substantially airtight system.
9. All duct liners shall be installed using fasteners in strict accordance with SMACNA Duct Construction Standards. Fastener pins shall be clinched pin type or welded pin type. The use of adhesive type pins is not acceptable. All liners shall have transverse edges coated with adhesive, all corners lapped and butted or folded.
10. Duct liners at fan discharges shall be lapped on outside of fan discharge flange or shall have metal nosing on leading edge. Fastening pin length shall be equal to liner thickness.
11. Provide easements where low pressure ductwork conflicts with piping and structure. Where easement exceeds 10% duct area, split into two ducts maintaining original duct area.
12. Plenums and Casings (Site Fabricated Units) [S]: Construct of galvanized steel panels joined by standing seams on outside of casing. Rivet or bolt all seams and joints on approximately 6" centers and seal with sealant. Reinforce with steel angles and provide diagonal bracing. Access doors shall be 36" x 18" with frame welded to plenum, three brass hinges and three brass tension fasteners operable from either side of door.
13. (Fibrous glass ductwork may be substituted for internally or externally insulated or uninsulated low pressure sheet metal ductwork when approved by Engineer.)
14. Ductwork associated with clothes dryer exhaust shall have smooth interior finish with joints running in the direction of airflow. (Ductwork associated with commercial clothes dryer shall be installed with a minimum 6 inches to combustible materials.)
15. All radiused elbows shall have centerline radius (R = 1.5 D), and shall be stamped or pressed smooth radius or minimum five gore type. Adjustable gore type fittings are not acceptable.
16. All locking regulator shall be Rossi Everlock, Elgen Super Standoff, or Windgate Sure-Loc HD, unless noted otherwise.

C. Low Pressure Ducts:
1. Sheet Metal Gauges:
a. Rectangular Ducts:

Max. Dimen., In.	Min. Gauge
Up to 30	24
31 to 54	22
55 to 84	20
85 and Over	18

b. Round Ducts:

Duct Diameter, In.	Min. Gauge
Up to 24	26
25 to 30	24
31 to 36	22
37 to 50	20
51 to 60	18
61 to 84	16

D. Medium and High Pressure Ducts:
1. Sheet Metal Gauges:
a. Rectangular Ducts:

Max. Dimen., In.	Min. Gauge
Up to 18	22
19 to 48	20
49 to 72	18
73 to 96	16
97 to 144	14

b. Round Ducts (Factory Made With Spiral Lock Seams equal to United McGill):

Duct Diameter, In.	Min. Gauge

Up to 26	24
28 to 36	22
38 to 50	20
51 to 60	18
61 and Over	16

c. Flat-Oval Ducts (Factory Made With Spiral Lock Seams equal to United McGill):

Max. Width, In.	Min. Gauge
9 to 24	24
25 to 48	22
49 to 70	20
71 and Over	18

2. Fittings shall be minimum 20 gauge on flat oval, but not less than 2 gauges heavier than ductwork in which it is installed on round and flat oval. Fittings for duct sizes 5" round and below may be minimum 24 gauge.
3. All take-offs shall be full body pre-manufactured 45° conical lateral type or alternate pre-manufactured fitting with equivalent loss coefficient. The use of field-installed or factory lateral taps or manifolds is not acceptable.
4. All elbows shall have centerline radius (R = 1.5 D), and shall be stamped or pressed smooth radius or minimum five gore type. Adjustable gore type fittings are not acceptable.

E. Flexible Ducts [S]: Flexible Ducts shall be Flexmaster Type 1M or Thermaflex type M-KE. Duct shall incorporate acoustic rated CPE or PE inner liner, 1" thick fiberglass insulation, and reinforced metalized vapor barrier. Maximum C factor shall be 0.24 btu/hr/sq.ft./°F at 75°F mean temperature. Duct shall have a working pressure of not less than 6 inches w.g. for positive pressure and 1 inch w.g. for negative pressure and suitable for velocities up to 4000 fpm. Vapor transmission shall be less than 0.05 Perm when tested in accordance with ASTM E96, Procedure A. The entire assembly shall be rated and marked as UL 181 Class 1. Flame Spread Rating shall not exceed 25 and Smoke Developed Rating shall not exceed 50 when tested in accordance with ASTM E-84-75, NFPA 255, and UL 723. Minimum duct insertion loss at 2500 fpm for a 10-foot length of straight duct shall be as listed below when tested in accordance with ADC FD-72 R1

Duct Insertion Loss, dB

Octave Band	2	3	4	5	6
Frequency, Hz	125	250	500	1000	2000
6 inch duct	7	19	34	37	38
8 inch duct	8	13	29	35	36
12 inch duct	20	26	27	33	26

(Flexible Ducts [S]: Mechanically corrugated single ply aluminum with continuous watertight lock seams, self-supporting with 1" thick fiber glass insulation, maximum C factor of 0.23 btu/hr./sq.ft./°F at 75°F mean temperature, and minimum 4 mil seamless vapor barrier jacket, reinforced aluminum foil, metalized polyester laminate. Duct shall have a working pressure of not less than 8 inches w.g. and suitable for velocities up to 5000 fpm. The entire assembly shall be rated and marked as UL 181 Class 1.)

F. Special Ducts:

Underfloor ducts shall be Monroe PVS, plastic coated steel duct. The underfloor duct shall have 4 X 1 coating, 4 mils of PVS coating on the outside and 1 mil PVS coating on the inside. All joints and fittings are to be constructed of PVS material. All sections shall be joined with sleeve sections attached with sheet metal screws. All joints shall be effectively sealed with PVS sealant and PVS tape to provide water tight connections. A PVS sealant shall be applied to any and all damaged or otherwise unprotected areas such as scratches, sheet metal screws, etc. to provide a total protected duct system. All underground duct systems shall be sloped to a drainage point as indicated on Drawings.)

1. All kitchen exhaust ducts carrying grease laden air (and all supply ducts located within 18" of a type I exhaust hood) shall be provided as indicated below:
    a. Where fire-rated enclosures are required: Grease ducts shall be factory fabricated, double wall, insulated grease duct [S] as manufactured by Metal-Fab, Metalbestos, or Hart & Cooley. Duct shall be suitable for 0" clearance to combustibles. Duct shall consist of minimum 0.035" thick stainless steel inner wall, minimum 0.024" aluminized steel outer wall, and high temperature ceramic insulation. Duct shall be classified under UL 1978 and UL 2221 and shall comply with NFPA-96. Duct system shall be one or two hour rated as required by VUSBC. Grease duct system shall include all supports, fittings, roof penetrations, expansion joints, etc. as necessary for a full and proper installation. Grease duct shall be installed in strict accordance with manufacturer's instructions. Shop drawing shall include a sketch showing the assembly of all sections.
    b. Where fire-rated enclosures are not required: Grease duct shall be field fabricated ductwork constructed from 16 gauge black sheet steel with all joints, seams and penetrations welded liquidtight. Mechanical fasteners shall not be used for assembly or support where such fasteners could penetrate the duct walls. Ducts shall run continuous from the hood connection to the exhaust fan connection a minimum of 40 inches above the roof. Ductwork shall be tested prior to installing any coverings. Two layers of fire wrap [S] shall be applied to the outside of the ducts. Fire wrap shall be Firemaster FastWrap XL as manufactured by Morgan Thermal Ceramics or equivalent by 3M or Unifrax. Fire wrap shall be 1-½ inches thick and shall be listed and labeled by UL in accordance with ASTM E 2336 for zero clearance to combustibles. Listed and labeled liquidtight access doors shall be provided by the fire wrap manufacturer and installed in the side of each horizontal section of duct for cleaning purposes. Access doors shall be a minimum of 12 inches and as otherwise outlined in the applicable code. Access door spacing shall not exceed 20 feet. Prior to Substantial Completion, the Contractor shall provide a letter from the fire wrap manufacturer stating that the fire wrap and grease duct access doors have been installed in accordance with manufacturer's installation instructions and that installation complies with the UL listing.
2. Watertight ducts shall be fabricated from copper sheets with soldered seams and joints or stainless steel sheets with brazed seams and joints. Thickness of material and fabrication shall be as required for low pressure systems except that thickness of material shall be suitable for soldering, brazing or welding without deformation or burning of the metal. All joints shall be watertight and low points shall be provided with drain tubes. Provide waterstops with drain tubes where indicated on plans.
3. Fume Exhaust Ducts: All ducts from fume hoods to their terminal point shall be stainless steel with welded seams and joints. Material thickness and fabrication shall conform to the requirement prescribed for low pressure ducts. Provide pressure test port at fan suction with positive closure.
4. Darkroom Hood Exhaust Ducts: All ducts from hoods to their terminal point shall be PVC. Material thickness and fabrication shall conform to the requirement prescribed hereinbefore.
5. All exposed round and flat oval ductwork (and concealed premanufactured ductwork indicated to be lined) shall be double-walled internally insulated duct with perforated internal liner, 1" acoustic insulation and paint grip or galvaneal coating on exterior. Provide all fittings and adapters to match lined duct. Insulation shall have K factor of 0.27 btu/hr./sq.ft./in./°F at 75°F mean temperature and minimum noise attenuation of 1.54 dB/ft. at a center frequency of 1000 Hz and 2000 fpm in 24" diameter duct. Ductwork shall be United McGill Acousti-K27 or approved equal. Joint mastic shall be totally concealed within fitting couplings.
6. (All exposed round and flat oval ductwork, concealed premanufactured ductwork indicated to be lined, all medium pressure supply ductwork (round, flat oval and rectangular) indicated to be lined and all return ductwork exposed outside shall be double-walled internally insulated duct with perforated internal liner, 1" acoustic insulation and paint grip

or galvaneal coating on exterior. Supply ductwork exposed outside shall be double-walled internally insulated duct with perforated internal liner, 2" thick acoustic insulation and paint grip or galvaneal coating on exterior. Provide all fittings and adapters to match lined duct. Insulation shall have K factor of 0.27 btu/hr./sq.ft./in./°F at 75°F mean temperature and minimum noise attenuation of 1.54 dB/ft. at a center frequency of 1000 Hz and 2000 fpm in 24" diameter duct. Ductwork shall be United McGill Acousti-K27 or approved equal. Joint mastic shall be totally concealed within fitting couplings. Refer to paragraph 2.02 O. for exterior exposed ductwork finish requirements.)

7. Provide a 4-inch diameter galvanized steel exhaust duct for all residential clothes dryers. Duct shall discharge outside the building and terminate with a weatherproof wall cap. Connection at wall shall be a recessed noncombustible metal wall box or wall receptacle. Coordinate exact location of wall box with dryer provided for flush installation of dryer to wall. Coordinate location with Owner where dryer is not in Contract. Wall box shall have paintable surface, shall have hidden nailing flanges, contain gas line connection when gas dryer is provided.
8. Where residential clothes dryer ducts are indicated to terminate through a flat roof, Contractor shall provide and install a roof jack, similar to the in-o-vate technologies DJK486U, and a minimum 12" tall insulated roof curb as specified for fans. Where residential clothes dryer ducts are indicated to terminate though a sloped roof, Contractor shall provide and install a roof jack, similar to in-o-vate technologies DJK486.

2.02 AIR DUCT ACCESSORIES

A. Access Doors:

1. Doors for low pressure rectangular ductwork shall be galvanized steel, 20 gauge rigid type, 12" X 16" minimum size unless noted otherwise, except where size of duct will not accommodate this size, they shall be as large as possible. Door shall have gasket, two hinges, and two compression latches with outside and inside handles. Provide insulated doors where installed in insulated ductwork.
2. Doors for round or flat-oval low, medium or high pressure ductwork shall be a complete factory mounted, duct section/access door assembly constructed of minimum 20 gauge galvanized steel. Access door shall match within two inches the diameter of duct and shall be complete with gasket, insulated door with handle, compression clips and chain retainer.

B. Fire dampers [S] shall be provided in accordance with the National Fire Protection Association Standard No. 90A. Dampers shall be UL 555 approved (for dynamic air systems), factory fabricated and assembled, and shall consist of 24 gauge, or heavier, interlocking curtain or rotating damper blades, fusible link and linkage, and 22 gauge, or heavier, galvanized steel frame. Dampers shall be tested for closure under airflow conditions and shall be labeled for maximum airflow and direction of flow. Where fire dampers are located in walls behind sidewall grilles, the fire damper shall be designed and UL listed for flush installation of the grille. Where fire dampers are located in watertight ductwork, fire dampers shall be constructed of 304 stainless steel; all duct/sleeve connections shall be sealed watertight with sealant in accordance with the terms of the UL Listing. Entire unit shall be securely anchored in structure where opening is made. Free area of fire damper for medium/high velocity ducts shall equal the cross section area of duct in which installed. Free area of fire damper for conventional velocity ducts shall be not less than 75% of the cross section area of duct in which installed. Dynamic fire dampers shall be rated for velocities up to 2000 fpm and pressures up to 4.0 in. wg. Fire dampers shall be furnished to the job site with instructions detailing UL approved installation method.

C. Radiation (Fire) Dampers [S] shall be UL 555C Classified for use in U.L. Fire Rated Floor/Ceiling and Roof/Ceiling assemblies to provide fire and heat protection where HVAC ducts and air devices penetrate the ceiling portion (rated gypsum board or rated acoustic tile) of the assembly or the rated portion of wooden joist protection for a Through Ceiling Membrane Penetration. Ceiling Radiation Dampers shall be selected in accordance with the size of the opening to be protected. Damper units shall consist of a minimum 24 gauge galvanized steel frame and minimum 24 gauge blades as required for the area of the opening. Blades shall be

protected with U.L. Classified insulation as required and shall contain no asbestos. Fusible links shall be rated for 165°F. Where the ceiling opening is larger than the ceiling radiation damper, a U.L. classified insulating blanket shall be provided to cover the entire space between the radiation damper and the ceiling system. Ceiling Radiation Dampers shall be furnished to the job site with instructions detailing U.L. approved installation method.

D. Gravity dampers shall be Airline type CBD counter balanced back draft damper constructed of felt edged aluminum blades. Set to open at .10" H2O. Maximum leakage rate shall be 20 cfm/ft2 at 1.0 inch water gauge when tested in accordance with AMCA 500D.

E. Dampers:
   1. General:
      a. Fabricate of galvanized steel.
      b. Where manual dampers occur behind or above finished portions of hard ceilings or walls, a remote cable operated damper by Young Regulator Co. shall be provided.
      c. Where dampers are located in accessible spaces, operators shall be locking type quadrant operators. Quadrant operators shall be installed on 1-1/2" high 4 bend galvanized steel bracket so that duct insulation may be extended and sealed under the quadrant operator.
      d. End of damper rod on each damper shall be grooved to show damper position.

F. Manual Volume Dampers shall be Ruskin model MD35, opposed blade multi-louver (single blade for dampers under 11" nominal) construction 16 gauge minimum with molded synthetic or stainless steel bearings, galvanized channel iron frame and maximum blade width of 8 inches. Axles shall be positively locked into blades to prevent slippage or loosening. Damper blades shall be interlocking type with linkage, control shaft, and standoff locking regulator (Rossi Everlock, Elgen Super Standoff, or Windgate Sure-Loc HD).

G. Rectangular branch take-off connections from mains shall be made using 45 degree entry fittings per SMACNA 1995 figure 2-6. Grille and register connections to mains shall be made using 45 degree entry fittings where space allows. Where diffuser, register or grille is located too close to the main, air deflectors shall be used. Air deflectors shall be factory fabricated. Adjustable deflectors shall be complete with worm gear operator when behind grilles, an extension rod and concealed regulator when above plaster ceilings, or self-locking lever type regulator when accessible. Locking regulator shall be Rossi Everlock, Elgen Super Standoff, or Windgate Sure-Loc HD.

H. Instrument Test Holes: Holes, with patches, in ducts and plenums shall be provided where directed or necessary for using pitot tubes for taking air measurements for balancing the air systems. At locations where ducts or plenums are insulated and on all medium and high pressure ductwork die cast collars with threaded neoprene caps shall be provided.

I. Apparatus Connections: At points where sheet metal connections are made to fans or where ducts of dissimilar metal are connected, provide a flexible connection of neoprene coated canvas of sufficient length to eliminate transmission of vibration. Flexible connections shall be securely fastened and air tight.

J. Duct Sleeves: Provide sleeved openings for all ducts, except where sleeves are furnished as part of a listed fire damper, smoke damper, or combination fire-smoke damper assembly. Sleeves for wall openings shall be 1 inch larger than the overall duct dimensions. Sleeves for floor openings shall be 1/4 inch larger than the overall duct dimensions. Fill the annular space between the duct or duct insulation and the sleeve full depth with mineral-fiber rope insulation. Where penetrations occur in assemblies required to maintain a fire-resistance rating, smoke resistance, or both, provide penetration-sealing materials and installation methods required to maintain the rating and integrity of the construction. Seal penetrations through corridor walls, smoke partitions, and draftstop partitions as required to maintain the integrity of the construction. Where fire dampers or combination fire-smoke dampers are required, provide sleeves sized to suit the damper assembly and install dampers in accordance with the damper manufacturer's listed installation instructions and applicable listing requirements. Do not install

packing, sealant, or firestopping materials at damper sleeves unless specifically permitted by the listed installation. In finished areas, provide flanges at each opening; flanges shall be constructed of 20-gauge galvanized sheet metal and shall be not less than 3 inches wide.

K. Prefabricated curbs shall be provided where ductwork above roof penetrates roof surface, sized to match ductwork and duct supports. Curbs shall be insulated type, 12 inches high complete with mounting flange and integral cant strip where acceptable to roofing manufacturer. Outer shell shall be mitered and welded continuously to form a rigid leakproof shell; inner shell shall be solid metal similarly constructed. Wood nailing strips shall be bolted to top of curb shell to provide means for securing flashing material to the curb. Curb shall be constructed of galvanized steel. Ductwork and insulation cover shall be counterflashed to the curb. Curb sidewalls shall be fully insulated to minimum R-5. Top of curb shall be gasketed for airtight fit of rooftop unit.

L. High Efficiency Take Offs (HETOs) [S] shall be 24 gauge G90 galvanized steel, welded and riveted construction. Each fitting shall have conical bell-mouth duct fitting, locking groove, insulation guard, adjustable damper with 3/8" square shaft, u-bolt, nylon bushings, and standoff locking regulator (Rossi Everlock, Elgen Super Standoff, or Windgate Sure-Loc HD).

M. All wire mesh, woven metal fabric, bird screens, and similar items shall be constructed from corrosion resistant, galvanized steel or aluminum.

N. (All ductwork exposed above the roof shall be field-coated with water-based fluid-applied material that incorporates heat reflecting, refracting, and dissipating ceramic particles in durable and adhesive coating, equal to ASTEC #900. Coating shall be applied in strict accordance with the manufacturer's instructions, to a minimum total dry film thickness of 12 mils.)

O. (Acoustic Lining [S]: Fiberglass insulation, 0.26 btu/in./sq.ft./°F./hr. maximum "K" value at 75°F, absolute roughness of exposed surface shall not exceed 0.005 ft., coated to prevent erosion at air velocities up to 2000 fpm, 1.5 lbs/cu. ft. minimum density. Noise reduction co-efficient shall average not less than 0.60 when tested by Acoustical Material Association procedure mounting 6. Liner shall be provided with EPA approved biocide in the erosion coating to protect against microbial growth. Liner shall meet or exceed requirements of ASTM G21 (fungi resistance) and ASTM G22 (bacterial resistance). Acoustic lining shall be one inch thick unless specifically noted otherwise.)

P. (Acoustic Lining: See Section 23 07 00.)

2.03 HVAC FANS [S] [O/M]

A. Roof fans and sidewall fans shall be equal to model indicated, roof or sidewall vent type, power exhaust fans having backward curved composite, aluminum, or steel blade centrifugal fan, directly connected as indicated to motor in fully enclosed air cooled motor compartment, outside of exhaust air stream. Fan and motor housing shall be aluminum. Provide electronically commutated motors (ECM) for all fans unless otherwise noted. ECM motor shall be suitable for connection to DDC system specified in 23 09 00 where required. All ECM motors shall be complete with means to adjust the speed of the fan either through the DDC system or at the fan. All ECM motors shall be speed controllable down to 20% of full speed (80% turndown). ECM motor shall be a minimum of 85% efficient at all speeds. Each fan shall be complete with bird screen and motor operated dampers. Each fan shall be tested and rated in accordance with AMCA Standard #210. Each fan motor shall be factory wired to a terminal strip mounted in a junction box attached inside the motor housing. A weather resistant switch or disconnect, with thermal overload, shall be provided in wiring between the terminal strip and motor connection. A thermally protected motor is NOT an acceptable alternative. Where a disconnect switch with thermal overload is not available from the manufacturer, the Contractor shall provide and install the necessary circuit protection. All motor operated damper actuators shall be coordinated to operate off the same electrical circuit as the associated fan, transformers shall be provided as required. (Explosion-proof motor and non-sparking wheel shall be provided where indicated.) (Fans indicated for fume service shall have all parts coated with a corrosion resistant finish

suitable for service indicated. Shop drawings shall include a letter from the factory stating the name of finish to be used and the suitability of the finish for service indicated.) (Multi-speed motors shall be provided where indicated.)

B. Centrifugal fans shall be Vent Set type with centrifugal fan wheel direct connected to motor. Fan and motor shall be mounted on a common base. Fan wheel shall be steel. Rubber in shear type vibration isolators shall be provided for entire unit. Motors shall be open drip proof sleeve bearing type.

C. In-Line fans shall be straight through blower complete with backward curved non-overloading steel or aluminum blades, direct drive, motor mounted out of the airstream, square steel enclosure, (rubber in shear vibration isolators) and disconnect switch with thermal overload wired to motor. Unit shall be suitable for mounting at any angle. Bearings shall be pre-lubricated and sealed at the factory. Power unit shall be accessible without disconnecting ductwork. (Entire unit shall be finished with baked on epoxy paint.) All motor operated damper actuators shall be coordinated to operate off the same electrical circuit as the associated fan, transformers shall be provided as required. Verify duct size at installation location.

D. Kitchen hood exhaust fan shall be upblast type of spun aluminum construction with backward inclined or airfoil blades, containing a built-in grease trough with grease collection pan, and having a motor compartment completely isolated from airstream. A weather resistant switch or disconnect with thermal overload shall be provided in wiring between the terminal strip and motor connection. Fan shall be U.L. 705 and U.L. 762 listed for grease removal and shall have a non-sparking wheel. Fan shall be hinged at or above the curb to allow inspection and cleaning of the inside of the fan and ductwork. Provide safety cable as required by the weight of the equipment.

E. Bathroom exhaust fans shall be equal to Nutone complete with aluminum inlet grille, fan and motor, (solid state variable speed controller with positive off,) discharge duct, backdraft damper in discharge outlet and (wall) (roof) cap.

F. Ceiling exhaust fans shall be complete with aluminum inlet grille with white finish coat, twin wheeled power unit with shaded pole motor, acoustic line steel housing with integrally wired junction box and disconnects for fan motor, (solid state variable speed controller with positive off,) and backdraft damper in discharge outlet.

G. Roof type supply fans shall be of model indicated, down discharge type, having (centrifugal) (propeller blade) fan directly or belt connected as indicated to motor. Fan and motor housing shall be steel or aluminum. Each fan shall be complete with bird screen, filters and motor operated dampers. Each fan shall be tested and rated in accordance with AMCA Standard #210. Each fan motor shall be factory wired to a terminal strip mounted in a junction box attached inside the motor housing. A weather resistant switch or disconnect with thermal overload shall be provided in wiring between the terminal strip and the motor connection. (Explosion-proof motor and non-sparking wheel shall be provided where shown.) (Multi-speed motors shall be provided where shown.)

H. All motor operated dampers shall be Class 1A with maximum leakage rate of 4 cfm/ft2 at 1.0 inch water gauge when tested in accordance with AMCA 500D.

I. Prefabricated curbs shall be insulated type, 12-14 inches high complete with mounting flange, integral cant strip, and rack or flange to support dampers. Outer shell shall be mitered and welded continuously to form a rigid leakproof shell, inner shell shall be solid metal similarly constructed. Wood nailing strips shall be bolted to top of curb shell to provide means for securing flashing material to the curb. Curb shall be constructed of (aluminum) (galvanized steel). Curb sidewalls shall be fully insulated to minimum R-5. Top of curb shall be gasketed for airtight fit of rooftop unit.

J. See PART 1 for spare parts requirements.

2.04 AIR OUTLETS AND INLETS [S]:

A. Acceptable Manufacturers:
   1. Standard Products: Price, Metal Industries, Krueger, Tuttle and Bailey, and Titus.
   2. Stainless Steel Products: Price, Keyes, and Anemostat.
   3. Security Products: Price, Metal Industries, Krueger, Keyes and Titus.

B. General:
   1. All devices shall be commercial grade and shall be constructed of steel or aluminum as indicated on the drawings.
   2. Manufacturer shall certify cataloged performance and ensure correct application of each air device to provide air pattern, velocity, pressure drop and sound characteristics NC suitable for space installed. Shop drawings shall include a fully itemized list of each devices air quantity, size, accessories, border style, pressure drop, throw ft, and sound level NC. Inclusion of the manufacturers catalog data is not acceptable. Shop Drawings without this information will not be reviewed.
   3. All devices located in ceilings shall have white baked enamel finish. Devices at other locations shall have prime finish suitable for painting or anodized aluminum unless noted otherwise.
   4. Maximum air outlet noise level shall not exceed NC25. Where the indicated size does not allow for an NC25, provide next largest size device. Where device in question is a linear slot diffuser, the number of slots shall be increased while holding the specified slot width and diffuser width the same.
   5. Provide sponge rubber seal around edges of all supply registers and grilles.
   6. All border styles shall be coordinated with the ceiling and\or wall in which they are installed. Where a discrepancy exists in the Drawings, the border type most suitable for the ceiling\wall type shall be submitted and discrepancy noted in the submission.

C. Diffusers:
   1. Round ceiling diffusers shall be adjustable fixed louver faced perforated (surface) (recess) mounted type complete with equalizing grid, volume control unit and anti-smudge ring.
   2. Square ceiling diffusers shall be welded steel or aluminum as indicated on the drawings, removable core, louver face, complete with volume control unit and adjustable vanes for down-discharge pattern.
   3. Strip diffusers shall be extruded aluminum adjustable pattern, recessed type complete with volume control, mounting frames, mounting yokes, mounting strips and accessories.
   4. Light troffer diffusers shall be (single) (double) plenum type constructed of galvanized steel low profile oval side inlet, 1/2” internal acoustical insulation, with damper and air pattern blade. Diffusers shall be finished matt black inside and shall be matched and coordinated with lighting fixtures specified in Section ELECTRICAL WORK.
   5. Drum Louvers shall be extruded aluminum adjustable pattern, recessed type complete with volume control, mounting frames, mounting yokes, mounting strips and accessories.
   6. Variable Air Volume Ceiling Diffusers shall be a complete thermally powered diffuser suitable for lay-in installation in a 24x24 exposed grid ceiling system. Diffusers shall sense room air temperature using induction of room air to a concealed thermal element. Diffusers shall have removable cover with all controls accessible from the unit face. Diffuser shall include one thermal changeover element, at least one thermal room element for heating and cooling, adjustable setpoint from 70 to 78°F and modulating diffusion blades or modulating damper to provide a complete self-contained installation. Diffusers shall alternately provide VAV cooling with VAV heating or constant volume heating unit (complete with appearance panel matching surrounding ceiling) to provide a complete self-contained installation.

D. Registers and Grilles:
   1. Return and exhaust registers shall be aluminum, unless noted otherwise, complete with 45 degree fixed airfoil vanes at not more than 1/2 inch centers. Provide 1 or 1-1/4 inch margin, 1/8 inch beveled frame with concealed screw holes. Damper shall be opposed blade face operated type with removable key. Units on watertight ducts shall be all

polished stainless steel or aluminum with baked enamel finish, including damper, linkage, core and frame.

2. Return or exhaust registers (floor mounted) shall be extruded aluminum linear grille with 0° fixed deflection grille bars. Grille bars shall be spaced at not more than 7/16 inches on center. Grille shall be complete with 1" margin frame with countersunk screw holes. Damper shall be factory mounted opposed blade face operated type with removable key.
3. Return Filter grilles shall be heavy duty aluminum with fixed horizontal blades spaced at 1/2" centers and set 45°. Blades shall run parallel to the long dimension of the grille. The mounting frame shall be designed to accept a standard one-inch filter media.
    a. The border shall be mounted to the filter frame with 1/4 turn quick-release fasteners. Filter shall be accessible from the face to allow easy cleaning or replacement. Filter efficiency shall be MERV-(4)(8)(13) and the filter type shall be (pleated)(panel).
4. Bottom registers in gymnasium shall be heavy duty steel to withstand abuse. Fixed horizontal vanes shall be minimum 14 gauge spaced on maximum 1/2" centers, and set at 38°. Vanes shall be set in heavy steel support bars at maximum 8 inch centers. Provide 1-1/4 inch margin steel frame and countersunk or concealed screw holes. Damper shall be opposed blade face operated type with removable key.
5. Supply Registers:
    a. Sidewall supply registers shall be aluminum complete with removable, reversible double deflection core and fixed horizontal or longitudinal deflecting vanes at not more than 1/3 inch centers. Provide 1 or 1-1/4 inch margin frame 1/8 inch beveled frame or 3/16 to 1/4 inch curved frame with concealed screw holes. Damper shall be opposed blade face operated type with removable key. Units shall be provided with core removal tools which shall be turned over to the Owner. Front row of deflection blades shall be horizontal.
    b. Ceiling supply registers shall be one, two, three or four way deflection as indicated on plans and shall have adjustable curved blades to discharge air along ceiling, 1-1/4" inch margin frame with countersunk screw holes and opposed blade face operated damper with removable key.
6. Grilles shall be as specified for registers except without opposed blade dampers.
7. All registers and grilles installed in a wall shall be provided with front blades parallel to the floor. Those installed in the ceiling shall have front blades parallel to the long dimension.

2.05 WALL LOUVERS [S]:

A. Louvers shall be stationary, stormproof units constructed of (16 gauge galvanized steel) (0.081" extruded aluminum) complete with 1/2" mesh matching bird screen in removable frame and extended sill. Blades shall be "S" or "K" shape spaced 3 1/4" - 4" O.C. Finish shall be (prime coat for field finish coat) (baked enamel) (mill finish) (anodized), color as selected by Architect. Pressure drop shall not exceed 0.10 inch H_2O at 700 fpm and water penetration shall not exceed 0.01 oz./sq. ft. at 500 fpm when tested in accordance with AMCA Standard 511, and shall be licensed to bear the AMCA seal. (All project louvers shall be provided under this Section. See Architectural Drawings for louvers not shown on Mechanical Drawings, at gables, elevator vents, smoke vents and similar areas.)

2.06 ROOF VENTS [S]:

A. Roof vents shall be provided by same manufacturer as roof fans and have same finish for matching appearance. Roof vents shall be louvered penthouse constructed of (16 gauge galvanized steel) (18 gauge extruded aluminum) suitably braced to prevent twisting and complete with 1/2" mesh matching bird screen and curb cap flashing. Finish shall be (prime coat) (baked enamel) (mill finish) (anodized) color as selected by Architect. (Provide motor-operated dampers with actuator where indicated.) Prefabricated curbs shall be insulated minimum R-5, minimum 12" high, provided complete with mounting flange, integral cant strip and rack or flange to support dampers. Outer shell shall be mitered and welded continuously to form a rigid leakproof shell, inner shell shall be solid metal similarly constructed. Wood nailing strips shall be bolted to top of curb shell to provide means for securing flashing material to the curb. Curb shall be constructed of same material as roof vent.

2.07 VENTILATION HOODS [S] [O/M]:

A. Kitchen Hood Make-Up and Exhaust System

1. General: The kitchen hood make-up and exhaust system shall be an integrated, packaged unit and shall include a make-up air unit, exhaust fan, exhaust hood, ductwork and controls. Shop drawings for this system shall be submitted as one package.
2. Make-Up Unit:
   a. General: Make-up unit shall be horizontal roof mounted (down) (side) discharge type, complete with forward curved centrifugal fan, electric heating coil, V-type filter section, rain hood, motorized inlet dampers, fan motor and adjustable V-belt drive, disconnect switch wired to motor, and access doors.
   b. Casing of the unit shall be of heavy gauge, rust protected steel, welded, and provided with easily removable access panels located on the side of the unit. Entire unit casing shall have a minimum of 1 inch thick thermal insulation.
   c. Heating coils are specified in Section 23 80 00.
   d. Filters shall be UL listed two inch thick throwaway type complete with filter frames, holding racks and clips. Filters shall be removable from either side of unit. Filter face velocity shall not exceed 350 fpm.
   e. Fans shall be double width, double inlet, centrifugal type. Fans shall be statically and dynamically balanced, after unit assembly, at the factory. Fans shall be mounted on steel shaft, and supported in ball type bearings with lubrication facilities extended to the motor side of the unit. Fans shall be driven by a unit mounted motor and V-belt drive. Belt drives shall be designed for at least 150% of the connected motor capacity, and sheaves shall be adjustable to provide at least 20% speed variation. Sheaves shall be selected to drive the fan at such speed to produce the specified capacity when set at its approximate midpoint.
   f. Equipment supports shall be 18 gauge galvanized steel complete with wooden nailer.
3. Supply Fan shall be (down) (side) discharge type, double width, double inlet, centrifugal type with forward curved blades. Fan shall be driven by a unit mounted motor and V-belt drive. Casing shall be constructed of galvanized steel and shall include 1” thick permanent cleanable filters, motor operated dampers, and a weather tight removable top for access. Motor operated dampers shall be Class 1A with maximum leakage rate of 4 cfm/ft2 at 1.0 inch water gauge when tested in accordance with AMCA 500D.
4. Exhaust fan shall be upblast type of spun aluminum construction with backward inclined or airfoil blades, containing a built-in grease trough with grease collection pan, and having a motor compartment completely isolated from airstream. Fan shall be U.L. 705 and U.L. 762 listed for grease removal and shall have a non-sparking wheel.
5. Exhaust hood shall be UL listed with a supply fire damper and shall meet all requirements of NFPA #96, UL and applicable building codes and shall be constructed of 18 gauge stainless steel with all seams and joints having a liquid tight external weld. The stainless steel shall have a180 grit finish and all joints shall be ground smooth and polished. The hood shall have a stainless steel filter housing, complete with UL listed extractors the full length of the housing and sized for the air quantity indicated. This housing shall terminate at the bottom with a pitched drip tray full length of the hood. The tray shall be easily removable for cleaning. The area of the hood below the filter housing shall have an enclosed chase for the fire protection system. Vapor-proof lights shall be installed on three to four foot centers completely wired and ready for an external power source. The lower front edge of the hood shall be furnished with a stainless steel air supply slot with adjustable straightening vanes and opposed blade dampers suitable for shut-off duty. (Stainless steel face registers with opposed blade dampers shall be furnished on the outer side walls of the hood to permit the supply of air into the kitchen area.) Hoods shall be mounted at 80” above floor and a minimum of 2’-0” above the cooking surface, or as indicated by the terms of the hood’s UL listing. Stainless steel filler skirts matching the hood shall be provided between the hood and ceiling where ceilings are higher than top of hood. Filler skirts shall be fully welded with flanged edges, bolted to hood.

6. Controls shall be a complete factory-furnished package including fuses, interlocks, switches, safety devices and all wiring required to interlock the make-up unit, exhaust fan and canopy mounted control station. (The electric heating section shall be complete with a minimum of steps of control, flow switch, discharge thermostat and thermal cutout.) The canopy mounted controls station shall have fan (and heater) switches with pilots, and canopy light switch, (and an adjustable thermostat control capable of resetting the make-up air discharge temperature.) A heat sensor with control relay shall be provided to energize the system upon detection of heat under the hood.
7. Fire Protection System: Furnish in canopy specified above, a wet chemical system, providing complete fire protection of duct, plenum and surface equipment. Installation to be in compliance with chemical manufacturer's UL listing. All piping run in hood to be concealed in a chase. Piping extending up through chase to duct and plenum nozzles fitted with sleeves, forming grease-tight joint. Provide chase openings for extending piping to surface nozzles. Chase to be fitted with removable panel for making field joints and final connections. Exposed piping of surface protection nozzles shall be schedule 40 stainless steel pipe with chrome plate elbows. System shall be activated by fusible links connected to automan release. Fit automan release with electric micro switch and wire from switch to a reset relay mounted on side of automan release. Provide fuel supply shut off in accordance with applicable codes. Gas fuel shut off valves to cooking appliances shall be provided as part of the Fire Protection System. All electric fuel shut off devices to cooking appliances and wiring by (others) (Division 26). Furnish and install a remote manual fire pull and integrate into system. Provide microswitch with dry contacts for energizing the hood exhaust fan (and de-energizing the make-up air unit). At time of installation, an authorized dealer of the chemical system shall complete and certify the system.
8. Roof Curbs shall be provided for the make-up and exhaust duct roof penetrations. Prefabricated curbs shall be insulated type minimum R-5, minimum 12 inches high complete with mounting flange and integral cant strip. Outer shell shall be mitered and welded continuously to form a rigid leakproof shell, inner shell shall be solid metal similarly constructed. Wood nailing strips shall be bolted to top of curb shell to provide means for securing flashing material to the curb. Curb shall be constructed of (aluminum) (galvanized steel) and shall be sized to support exhaust fan discharge a minimum of 40 inches above the roof surface.
9. See PART 1 for spare parts requirements.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Duct clearance and lengths shall be established from measurements taken at the job site before any ducts are fabricated.

B. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing and balancing of system. Where exhaust ducts are installed within a chase or shaft, pitot tube shall extend to the outside of the chase or shaft and be capped.

C. Locate ducts with sufficient space around equipment to allow normal passage, and operating and maintenance activity.

D. Locate all ductwork to align with the ceiling grid where connections are to be made to Diffusers, Registers and Grilles. Field verify exact grid location before installing ductwork.

E. Locate all Diffusers, Registers and Grilles as indicated on plans and in accordance with the Reflected Ceiling Plans, if provided.

F. Provide low loss factory fabricated fittings for all round take-off connections to low velocity rectangular ducts.

G. All Flex duct shall be properly supported to prevent any short radius bends or kinks. Connections to diffusers shall be made using long radius bends or elbows with turning vanes to ensure that airflow is distributed evenly across the neck of the diffuser. Conditions that create higher airflows in one quadrant of diffuser throw are not acceptable. Maximum flex duct runout length shall be 5 feet. Flex duct shall not penetrate wall construction of any type.
   1. Flex duct clamps shall be Thermaflex Snaplock Clamp or equal using minimum ½" wide stainless-steel band with cadmium plated hex bolt to tighten band with worm-gear action.

H. Install duct accessory items in accordance with manufacturers printed instructions.

I. Install volume, smoke and fire dampers where shown on plans.

J. Manual volume dampers shall be installed at all branch connections, divided flow branches, and end-of-run diffuser/register connections for low pressure supply, return, and exhaust duct systems. Manual volume dampers shall be installed within 3 feet of the main duct.

K. Provide access doors at all automatic dampers, fire/smoke dampers, duct heaters, duct mounted coils, thermostats and at all other points requiring inspection or servicing. Duct access doors for fire and smoke dampers shall be permanently labeled with minimum 1/2 inch high letters reading FIRE DAMPER or SMOKE DAMPER. Labeling shall be as specified for equipment nameplates under Section 23 05 53.

L. Fire dampers shall be UL listed for the type assembly in which they are installed.

M. All grease exhaust ductwork shall be sloped downward to the hood or an approved receptacle at not less than 1/4 inch per foot.

N. Where clothes dryer exhaust duct is installed concealed within the building construction, a label shall be provided indicating the equivalent length of the exhaust duct. The label shall be located within six feet of the duct connection. Where dryer exhaust duct is concealed within walls or behind hard ceilings, shield plates shall be installed between the duct and the finished face of the framing members to prevent damage from nails or screws. Coordinate dryer wall box with baseboard molding and masonry coursing as applicable.

O. All watertight ductwork shall be sloped downward to the air inlet or to a waterstop with drain tube. Slope shall be not less than 1/4 inch per foot.

P. Connection of horizontal ducts to rooftop exhaust fans shall be made using radiused elbows or mitered elbows with turning vanes. Duct transitions shall be as hereinbefore specified.

Q. Ductwork installed or stored on site shall be protected such that open ends are covered to prevent construction dust and debris and other foreign matter from being introduced into the duct systems. If at any time during construction, dust or debris is discovered within the duct systems or ducts openings are observed to be unprotected, the Contractor will be responsible for properly cleaning all duct systems in accordance with NADCA procedures for the respective type of ductwork.

R. Grille, Register and Diffuser Installation:
   1. Boots to diffusers shall fit airtight to diffuser necks and diffusers shall be securely fastened thereto.
   2. Where grilles are installed at walls or ceilings, the duct shall be fastened securely to the masonry or panel at each side of the opening and the grille shall be securely fastened snug against the masonry or panel.
   3. If flanged grille frames are used on exposed ducts, runout shall be same size as outside dimension of flange and full depth of register assembly.
   4. Unless otherwise indicated in the Contract Documents, sidewall grilles and registers to be installed high shall be installed within 6 inches of the ceiling or nearest overhead projection. Unless otherwise indicated in the Contract Documents, sidewall registers and or grilles to be installed low shall be installed within 6 inches of the floor, but shall be coordinated with cove or base molding. Sidewall registers shall also be coordinated with the block coursing where applicable.

5. Air saddles shall be installed on the light fixtures at the time the light fixture is installed. Air passage knockouts in air handling light fixtures, shall be punched out as required. Cooperation with electrical trade is required.
6. Ceiling diffusers shall be installed in and coordinated with the ceiling tile or other ceiling units. Diffusers, Registers and Grilles shall be centered in each ceiling unit, unless shown otherwise. Mounting frames shall be installed as required to support diffusers, registers and grilles. Grilles, registers and diffusers shall not be supported from the ceiling system, conduit, piping or unrelated ductwork.

S. (Patching: Where existing control, monitoring or other penetrating devices are removed from ductwork, the opening shall be patched to match thickness, type and finish of existing ductwork, and sealed airtight.)

3.02 DUCT CLEANING:

A. Clean (new)(existing-to-remain) (supply)(return)(exhaust) duct systems before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.
1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch duct as recommended by duct manufacturer. Comply with paragraph "Air Duct Accessories" in this Section for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:
1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:
1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:
1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of ducts or duct accessories.
4. Clean fibrous-glass duct with HEPA vacuuming equipment; do not permit duct to get wet. Replace fibrous-glass duct that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.

5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

F. Source-Removal Cleaning Methods: The HVAC system shall be cleaned using source-removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and to safely remove these contaminants from the facility. No cleaning method, or combination of methods, shall be used that could potentially damage components of the HVAC system or negatively alter the integrity of the system.
   1. Use continuously operating vacuum-collection devices to keep each section being cleaned under negative pressure.
   2. Cleaning methods that require mechanical agitation devices to dislodge debris that is adhered to interior surfaces of HVAC system components shall be equipped to safely remove these devices. Cleaning methods shall not damage the integrity of HVAC system components or damage porous surface materials such as duct and plenum liners.

G. Cleaning Mineral-Fiber Insulation Components:
   1. Fibrous-glass thermal or acoustical insulation elements present in equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment while the HVAC system is under constant negative pressure and shall not be permitted to get wet according to NADCA ACR 2006.
   2. Cleaning methods used shall not cause damage to fibrous-glass components and will render the system capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2006).
   3. Fibrous materials that become wet shall be discarded and replaced.

H. Duct System Cleanliness Tests:
   1. Visually inspect duct system to ensure that no visible contaminants are present.
   2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
   3. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
   4. Duct system will be considered defective if it does not pass tests and inspections.
   5. Prepare and submit test and inspection reports.

3.03 DUCT SCHEDULE:

A. All ductwork shall be fabricated, installed, sealed, and tested in accordance with the schedule below. All testing shall be in accordance with the latest edition of the SMACNA HVAC Air Duct Leakage Test Manual.
   1. Testing shall be conducted and the results approved by the Architect/Engineer prior to the application of insulation.
   2. The Architect/Engineer shall be notified one week prior to conducting the test. Unless specifically waived, the Engineer and Owner reserve the right to witness the test. Final, signed and dated test results shall be documented as outlined in SMACNA HVAC Air Duct Leakage Test Manual and submitted to the Architect/Engineer.

B. Supply Ductwork
   1. Medium pressure (to include all ductwork upstream of VAV boxes):
      a. Pressure Class: Positive 6” w.g.
      b. Seal Class: A
      c. Leakage Class for Round Duct: 3
      d. Leakage Class for Rectangular Duct: 6

e. Testing Requirement: 100%

2. Low pressure duct downstream of VAV boxes:
   a. Pressure Class: Positive 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 12
   d. Leakage Class for Rectangular Duct: 12
   e. Testing Requirement: 25%
3. Low pressure duct connected to air handling units, energy recovery units, and rooftop air conditioning units/heat pumps in excess of 5 tons:
   a. Pressure Class: Positive 3” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 6
   d. Leakage Class for Rectangular Duct: 6
   e. Testing Requirement: 25%
4. Low pressure duct connected to cabinet unit heaters, fan coil units, and heat pumps - 5 tons or less:
   a. Pressure Class: Positive 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 12
   d. Leakage Class for Rectangular Duct: 12
   e. Testing Requirement: N/A
5. Ductwork located outdoors:
   a. Pressure Class: Positive 6” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 3
   d. Leakage Class for Rectangular Duct: 6
   e. Testing Requirement: 100%
6. Ductwork connected to equipment not listed above:
   a. Pressure Class: Positive 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 12
   d. Leakage Class for Rectangular Duct: 12
   e. Testing Requirement: N/A

C. Return Ductwork:

1. Ductwork located outdoors:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 6
   d. Leakage Class for Rectangular Duct: 6
   e. Testing Requirement: 100%
2. Ductwork located in unconditioned spaces or fully ducted systems located above ceiling:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 12
   d. Leakage Class for Rectangular Duct: 12
   e. Testing Requirement: 10%
3. Ductwork exposed in conditioned spaces or installed in ceiling return plenums:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 24
   d. Leakage Class for Rectangular Duct: 24
   e. Testing Requirement: N/A
4. Ductwork connected to cabinet unit heaters, fan coil units, or heat pumps – 5 tons or less:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: A

c. Leakage Class for Round Duct: 12
d. Leakage Class for Rectangular Duct: 12
e. Testing Requirement: N/A

5. Ductwork connected to equipment not listed above:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 12
   d. Leakage Class for Rectangular Duct: 12
   e. Testing Requirement: N/A

D. Exhaust Ductwork:

1. Ductwork located outdoors:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 6
   d. Leakage Class for Rectangular Duct: 6
   e. Testing Requirement: 100%
2. Negative pressure general exhaust:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 12
   d. Leakage Class for Rectangular Duct: 12
   e. Testing Requirement: N/A
3. Positive pressure general exhaust:
   a. Pressure Class: Positive 2” w.g.
   b. Seal Class: A
   c. Leakage Class for Round Duct: 12
   d. Leakage Class for Rectangular Duct: 12
   e. Testing Requirement: 10%
4. Fume exhaust:
   a. Pressure Class: Negative 6” w.g.
   b. Seal Class: Welded
   c. Leakage Class for Round Duct: 3
   d. Leakage Class for Rectangular Duct: 3
   e. Testing Requirement: 100%
5. Watertight and dishwasher hood exhaust:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: Welded
   c. Leakage Class for Round Duct: 3
   d. Leakage Class for Rectangular Duct: 3
   e. Testing Requirement: N/A
6. Grease Duct:
   a. Pressure Class: Negative 2” w.g.
   b. Seal Class: Welded
   c. Leakage Class for Round Duct: 3
   d. Leakage Class for Rectangular Duct: 3
   e. Testing Requirement: 100% Light test (or other test approved by the Code Official in accordance with local and state codes).

3.04 FANS:

A. Coordinate roof opening and locations with structural system.

END OF SECTION

SECTION 23 8000

DECENTRALIZED HVAC EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY:

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Split System Heat Pump Units
2. Ductless Split System Air Conditioners
3. Heating and Cooling Coils
4. Gas Detection System
5. Miscellaneous Appurtenances

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 05 53 – Identification for HVAC Piping and Equipment
5. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
6. Section 23 09 00 – Instrumentation and Control for HVAC
7. Section 23 20 00 – HVAC Piping and Pumps
8. Section 23 30 00 – HVAC Air Distribution

1.02 REFERENCES:

A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.

B. Air Moving and Conditioning Association, Inc. (AMCA):

Bulletin 210	Standard Test Code for Air Moving Devices

C. Air Conditioning and Refrigeration Institute (ARI):

Standard 210	Standard for Unitary Air Conditioning Equipment
Standard 240	Standard for Unitary Heat Pump
Standard 310	Standard for Packaged Terminal Air Conditioners
Standard 410	Standard for Forced Circulation Air Cooling and Heating Coils
Standard 440	Standard for Room Fan Coil Air Conditioners

D. American National Standards Institute (ANSI):

Standard B31.1	Code for Pressure Piping

E. American Society of Heating, Refrigeration and Air Conditioning Engineers (ANSI/ASHRAE):

Standard 15	Safety Code for Mechanical Refrigeration

F. National Fire Protection Association (NFPA):

Standard 90A	Air Conditioning and Ventilating Systems of other than Residence Type

G. National Electrical Manufacturers Association (NEMA)

H. Sheet Metal and Air Conditioning Contractors' Association (SMACNA)

Duct Construction Standards (Latest Edition)

I. Underwriters Laboratories, Inc. (UL)

1.03 EQUIPMENT LABEL:

A. All mechanical equipment and appliances shall be listed and labeled by a nationally recognized testing and inspection agency approved by the authority having jurisdiction. All equipment and appliances shall be installed in accordance with the conditions of the listing. Manufacturer's installation instructions shall be available at the job site at the time of inspection.

1.04 COMMISSIONING OF HVAC SYSTEMS:

A. The Contractor shall provide contact information to the Commissioning Agent indicated in Division 1 for all major items of Equipment.

B. Provide additional submittal copy of major equipment for Commissioning Agent specified in Division 1.

1.05 SUBMITTALS:

A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.

B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.

C. Operation and maintenance data shall be submitted in accordance with Division1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.

1.06 SPARE PARTS:

A. Each cooling or heating unit shall be provided with 3 sets of filters. At end of construction each unit shall be provided with a clean filter and one set shall be turned over to the Owner as spares.

B. Each belt driven piece of equipment shall be provided with one spare set of belts to be turned over to the Owner at the end of construction.

PART 2 - PRODUCTS

2.01 SPLIT SYSTEM HEAT PUMP UNITS [S] [O/M]

A. General: Heat Pump Air Conditioners shall be commercial style Trane split type as shown complete with refrigeration section, condenser and evaporator coils, fans, controls and piping. Each unit shall conform with the applicable ARI Standard.

B. Split type units:

1. Indoor unit shall be variable speed, multi-position type complete with cooling coils, electric heating coils, fans, ECM fan motor and drive, filters, drain pan, controls and refrigerant piping enclosed in a double wall insulated casing (R-4.2). Cabinet shall have leakage rate of less than or equal to 2%. Cooling coils shall be non-ferrous direct expansion type. Heating coils shall be slide-in, electric type as shown. Fan motor drive shall be fully guarded. Filters shall be one inch thick pleated media. Provide thermal expansion valve and sight glass for each cooling coil circuit and liquid solenoid as required for compressor capacity control. Provide integral circuit breaker for single point power connection. Auxiliary heaters shall be mounted in discharge plenum section furnished as part of the unit. Outdoor thermostat shall de-energize auxiliary heaters when air temperature rises above 35°F.

2. (Indoor unit shall be variable speed, multi-position type complete with electric emergency heating coil, fans, ECM fan motor and drive, filters, drain pan, and controls enclosed in a double wall insulated casing (R-4.2). Cabinet shall have leakage rate of less than or equal to 2%. Filters shall be one inch thick pleated media, efficiency as indicated on the Drawings.
   a. Heat pump coil shall be a cased coil, complete with drain pan, controls, and refrigerant piping enclosed in an insulated casing. Coils shall be non-ferrous direct expansion type. Provide thermal expansion valve and sight glass for each cooling coil circuit and liquid solenoid as required for compressor capacity control.)
3. Outdoor unit shall be complete with compressor-motor unit, condenser coil, reversing valve, stamped sheet metal condenser coil guards, condenser fans, motor starters, controls and piping enclosed in a sheet steel enclosure recommended for outside installation. Condenser fans shall be vertical or horizontal discharge as shown. Intake and discharge openings shall be provided with welded-wire or stamped sheet metal coil guards. Condensing unit controls shall provide automatic capacity modulation and condenser and evaporator pressure control for operation down to 0°F outside air temperature. Provide high refrigerant pressure switch. Crankcase heater shall be provided in compressor body. Units shall come factory pre-charged with refrigerant. Condensers shall be equipped with field installed 7” snow legs as provided by the equipment manufacturer. Each single-phase outdoor unit for air conditioning or heat pump unit shall be provided with a soft starter module factory wired or field wired into the system. Soft starter module shall be Emerson SecureStart, Hyper Engineering SureStart, or approved equal. Soft starter modules shall provide for loss of power detection, low voltage sags, and intermittent power dropouts lasting 0.1 to 3 seconds. Modules shall protect against compressor motor reversal by preventing restarts in event of intermittent lapse in power supply. Modules shall provide detection of motor reversal and stop the motor for 3 minutes. Modules shall provide for reduction of inrush current during startup and protection of motors during low-voltage conditions.

C. Refrigerant piping and specialties are specified in Section 23 20 00. Systems shall be suitable for refrigerant piping configuration and lengths indicated.

D. Controls for safe automatic controlled operation of each system shall be provided. (Operation shall be as specified in Section 23 09 93.) Provide thermostat to limit cooling coil discharge air to 45°F or above by cycling the compressor(s). (See Programmable Thermostats as specified hereinafter for requirements.) Fan motors shall have soft start control and fan mode delays.

E. Refrigerant: Each system shall be cleaned, purged and completely charged with refrigerant and oil, and guaranteed to be free of leakage for one year.

F. Performance Test: Each system shall be tested and checked out for safe controlled operation. One week before final inspection, a letter in three copies from the certified representative shall be submitted to the Engineer certifying that each system is performing safely and satisfactorily.

G. Warranty: Motor-compressor shall be guaranteed for five (5) years. Indoor unit shall have 10-year registered warranty.

H. Set rooftop condensing unit on roof mounted equipment supports. Supports shall be factory fabricated equipment mounting pedestals sized for the weight of the equipment indicated. Pedestals shall be minimum 12 inches high, complete with equipment rail, slide channel “U” shaped mounting brackets, 18 gauge threaded galvanized rods, lateral spacer bracket and galvanized slide assembly.

I. See PART 1 for spare parts requirements.

2.02 DUCTLESS SPLIT SYSTEM AIR CONDITIONERS [S] [O/M]:

A. General: Equipment specified under this heading shall be manufactured by Mitsubishi, Daikin, Sanyo, or equal. Each system shall consist of condensing unit, air unit, refrigerant piping and system controls. Each system shall conform with the applicable ARI standards.

B. Condensing (outdoor) unit shall be complete with compressor-motor unit, condenser coil, welded-wire or stamped sheet metal condenser coil guards, condenser fans, motor starters, controls and piping enclosed in a sheet steel enclosure recommended for outside installation. Condenser fans shall be vertical or horizontal discharge. Intake and discharge opening shall be safely guarded. Condensing unit controls and accessories shall provide automatic capacity modulation and condenser and evaporator pressure control for operation down to 0°F outside air temperature. Unit shall be supported in accordance with manufacturer's installation instruction.

C. Fan coil unit (indoor) shall be a wall mounted configuration complete with cooling coil. Fan motor and drive, filters, controls, refrigerant piping, insulated enclosure and guide vanes on air discharge. Cooling Coils shall be non-ferrous direct expansion type. Filters shall be manufacturer provided, permanent, washable filter which is user accessible. Provide capillary tube and sight glass for each cooling coil circuit.

D. Condensate pump shall be, in addition to manufacturer supplied unit, Sauermann Model # Si-3200. Pump shall be rated for minimum 3.3 GPH; 3.3 feet suction head; and 10 feet discharge head. Unit shall be provided with condensate drain pan safety switch to de-energize the unit upon accumulation of water in the drain pan.

E. Refrigerant piping and specialties shall be as specified in Section 23 20 00.

F. Controls for safe automatic controlled operation of the system (including low ambient controller, winter start control, evaporator freeze thermostat, crankcase heater, cycle protector, thermostatic expansion valve kit) shall be from wall mounted controller. All accessory controls shall be installed in accordance with manufacturer's recommendation.

G. Refrigerant: The piping system shall be completely charged with refrigerant and oil, and guaranteed to be free of leakages for one year.

H. Performance Test: The system shall be tested with a thoroughly cleaned filter and checked out for safe controlled operation. One week before final inspection, a letter in three copies from the certified representative shall be submitted to the Engineer certifying that the system is performing safely and satisfactorily.

I. Warranty: Motor-compressor shall be guaranteed for five (5) years.

J. See PART 1 for spare parts requirements.

K. Set rooftop condensing unit on roof mounted equipment supports. Supports shall be factory fabricated equipment mounting pedestals sized for the weight of the equipment indicated. Pedestals shall be minimum 12 inches high, complete with equipment rail, slide channel "U" shaped mounting brackets, 18 gauge threaded galvanized rods, lateral spacer bracket and galvanized slide assembly. Supports shall be located to adequately support duct with no more than 4 feet of pipe unsupported.

L. Indoor unit shall be mounted maximum 6" below the ceiling.

2.03 HEATING AND COOLING COILS [S]:

A. General: This specification applies to all coils whether remote mounted, mounted in factory fabricated air handling units or mounted in site-built units and shall be used as a guideline to establish the minimum requirements unless definitely specified otherwise for the particular case involved.

B. Direct expansion (DX) refrigerant evaporator coils shall be full tube face, fin and tube type constructed of seamless copper tubes and aluminum fins mechanically bonded to tubes. Coil support frame shall be heavy gauge galvanized steel with heavy gauge flanges and support plates. Tubes shall be 1/2 inch or 5/8 inch diameter. Tube wall shall be minimum 0.020 inch thickness. Fins shall be minimum .0075 inch thickness. Tubes shall be staggered and circuited with equalizing distributing tubes to match the number of compressor refrigerant circuits provided. Coil circuiting shall be full face interlaced type where required for optimum capacity

reduction. Units shall be provided with brass liquid distributors for each circuit. Coils shall be factory proof tested at 450 psig and leak tested at 300 psig, cleaned, dehydrated and sealed with dry nitrogen charge. Coils shall be coordinated with the manufacturer of the condensing unit for capacities indicated. Cooling coil ratings shall be certified in accordance with ARI Standard #410. Maximum cooling coil face velocity shall not exceed 550 feet per minute.

C. Electric coils shall be UL approved and shall be 80% nickel – 20% chromium bare wire heating elements, unless indicated otherwise, mounted in a frame and wired at the factory to an identified terminal strip enclosed in a metal box on one end of the coil. Heater frame shall be constructed for slip-in or flanged frame installation as applicable. Thermal cutout shall be provided to prevent the coil from overheating. (Magnetic contactor and fuse shall be provided for each step of control.) (Solid state silicone controlled rectifiers (SCR) shall be provided for fully modulating control.) Control voltage shall be suitable for control system indicated. Contactors and fuse block shall be UL approved and mounted and wired inside a steel cabinet for remote mounting with all wiring terminated at an identified terminal strip inside the cabinet. Provide air motion switch to prevent heater from operating unless there is proper air flow. Provide additional interlock connections as indicated in Section 23 09 00. An interlocking safety disconnect switch shall be provided in the terminal box door of each coil.

D. Heating and cooling coils in the same unit shall be provided as separate coils with independent fin sheets to allow preheat, dehumidification, and individual removal of each coil.

2.04 Gas Detection System [S] [O/M]:

A. Honeywell E3Point wall-mounted standalone gas detector for monitoring toxic, oxygen, and combustible gases.
   1. Response time: <50 seconds.
   2. Gas Detection: CO, NO2, C3H8, O2, H2, H2S.
   3. Nominal Accuracy: +3% of full scale
   4. Visual and audible alarm for three levels of gas detection.
   5. Resolution:
      a. CO: 1 ppm
      b. NO2: 0.1 ppm
      c. C3H8: 0.5% LEL
      d. O2: 0.1% vol.
      e. H2: 0.5% LEL
      f. H2S: 0.1 ppm
   6. Range:
      a. CO: 0-250 ppm
      b. NO2: 0-10 ppm
      c. C3H8: 0-100% LEL
      d. O2: 0-25% vol.
      e. H2: 0-100% LEL
      f. H2S: 0-50 ppm
   7. System shall have automatic and manual activation of exhaust fans.
   8. System shall native BACnet communications and be integrated with head end system specified in Section 230900.

2.05 MISCELLANEOUS APPURTENANCES [S] [O/M]:

A. Gravity Dampers [S] shall be Ruskin counter balanced back draft damper constructed of felt edged aluminum blades. Set to open at .10" H_2O.

B. Manometers [S] shall be provided for all filter stations of 2000 cfm capacity or more and shall be Dwyer 260-AF Series inclined type, solid acrylic air filter gauge complete with mounting hardware, static pressure tips, two 5' lengths of 1/4" diameter aluminum tubing, two 3-way vent valves, over-pressure safety trap to prevent loss of oil and any other accessories necessary for effective operation of the gauge. The operating range shall be 0-1.5 inches water column.

C. Miscellaneous electric appurtenances such as transformers, solenoid valves, electric relays, selector switches, on-off switches, pilot lights and other similar items required by the electric sequence control diagrams and not shown to be provided by the Electrical Contractor shall be provided as part of the Mechanical Contract.
   1. Solenoid valves shall be Asco or Alco of coil rating and size to accomplish the indicated requirement.
   2. On-Off switches shall be toggle type, 20 amp. contract rating complete with engraved cover plate where required.
   3. Selector switches shall be manual selector type with the indicated poles and contacts and engraved cover plate. Contact rating shall be a minimum of 20 amps.
   4. Relays shall be G.E., Square D, or Cutler-Hammer 20 amp rating with sufficient contacts for the sequence indicated.

D. Time clock [S] [O/M] shall be Paragon Model 7218 or Tork Model W220, seven-day model with 10 hour minimum reserve time feature. Reserve time spring shall rewind itself after power source is restored.

E. Thermostats [S] [O/M] shall be provided as indicated below. The use of thermostats containing mercury is not allowed.
   1. Programmable Thermostats (s):
      a. Programmable thermostats shall be Honeywell T7300A thermostat and a Q7300 subbase, or approved equal for (conventional heating/cooling) (heat pump) operation. The thermostat shall contain a keyboard for entering the times and temperatures along with a liquid crystal display for reading information. The thermostat shall contain a microprocessor that performs the calculations to control the system.
      b. The T7300A thermostat shall contain a three hour override button, enabling programmed temperatures to be overridden from unoccupied mode to occupied mode.
      c. The T7300A thermostat with Q7300 subbase shall provide a system that will control with system or fan switching and seven-day flexible programming with two occupied and two unoccupied periods per day for each of the seven days of the week. The system shall have individual setpoints for occupied heat and cool, and unoccupied heat and cool. System shall have auxiliary relay output for occupied/unoccupied control of auxiliary fans and dampers. System shall have capability to provide contact closures for two stages of output for heating and two stages of output for cooling.
   2. (Night low limit thermostats) (Unit heater thermostats) for space mounting shall be Johnson Controls T26, line voltage type with SP-ST switching action rated 6 amp. full load and 36 amp. locked rotor at 120 volts.
   3. Exhaust fan thermostats shall be Johnson Controls T22 with auto-off fan switch. The thermostat shall be rated for 6 amps. at 120 volts.
   4. Heavy duty heating thermostats shall be Johnson Controls T22 rated for 16 amps. at 120 volts.
   5. Electric cooling thermostats shall be Johnson Controls T26J rated for 6 amps. at 120 volts.
   6. Outdoor thermostats shall be Johnson Controls A19 Series.
   7. Firestats shall be UL approved, Johnson Controls A25 manual reset type with an adjustable temperature setting. Set at 125°F.
   8. Thermostat guards shall be rectangular (wire, plastic, cast aluminum) with baseplate (except wire type) and all required accessories for wall mounting. Guards shall have ample openings to allow fast sensing of room air conditions. Guards and baseplate shall be selected and sized to suit type of thermostat and mounting where installed.

F. (Equipment rails for rooftop condensing units shall be Roof Products and Systems (RPS), Model ER-4 or equal. Equipment rails shall be fabricated of 18 gauge galvanized steel with built-in cant, monolithic construction with integral base plate and continuous mitered and welded corner seams, with factory installed wood 2x4 nailer. Each equipment rail shall include a matching 18 gauge galvanized steel counterflashing cap with integral drip edge, all corners

mitered and welded, and screws for attachment. Equipment Rails over 3 feet long shall incorporate 14 gauge internal gusset reinforcing. Rail height shall be 9”-16”.)

G. Dampers and Damper Motors:
   1. Automatic control dampers shall be opposed blade construction for modulating service and parallel blade construction for two-position service. Dampers shall be of the multi-louver construction with brass bearings, channel iron frame and maximum width of 10”. Damper blades shall be interlocking felt edged and air tight.
   2. Damper motors shall be provided for all automatic dampers and shall be sufficient capacity to operate the connected damper. Damper motor shall be electric type.

PART 3 - EXECUTION

3.01 GENERAL:

A. All equipment and materials, specified herein or shown on the drawings shall be installed complete, coordinated with all other work, tested and made tight and put into safe controlled operation to perform its intended function as a part of this project.

B. All rooftop equipment shall be secured to the roof framing structure.

3.02 ROOFTOP AIR CONDITIONING (HEAT PUMP) UNITS:

A. Coordinate all openings and location with structural systems.

B. Contractor’s attention is directed to Section 23 05 48 for requirements.

C. Install and connect unit in accordance with manufacturer’s recommendations and contract drawing details. Should conflicts in the two occur notify the Architect/Engineer.

D. Coordinate all control items with Section 23 09 00.

3.03 ROOFTOP CONDENSING UNITS:

A. Rooftop condensing units shall be installed on factory fabricated equipment rails as hereinbefore specified.

END OF SECTION

SECTION 26 0500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Every item of labor, material, devices and appurtenances for installing a complete Electrical System and other related systems included in Division 26 of the Specifications.

B. Section 26 05 00 – Common Work Results For Electrical

C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

D. Section 26 05 23 – Control Voltage Electrical Power Cables

E. Section 26 05 26 – Grounding And Bonding For Electrical Systems

F. Section 26 05 33 – Raceway And Boxes For Electrical Systems

G. Section 26 05 36 – Cable Management For Electrical Systems

H. Section 26 05 43 – Underground Ducts And Raceways For Electrical Systems

I. Section 26 05 53 – Identification For Electrical Systems

J. Section 26 05 73 – Overcurrent Protective Device Coordination Study

K. Section 26 09 23 – Lighting Control Devices

L. Section 26 09 36 – Lighting Control System

M. Section 26 20 00 – Low-Voltage Electrical Distribution

N. Section 26 22 00 – Low-Voltage Transformers

O. Section 26 24 16 – Panelboards

P. Section 26 27 26 – Receptacles

Q. Section 26 28 13 – Fuses

R. Section 26 28 16 – Enclosed Switches And Circuit Breakers

S. Section 26 29 00 – Low-Voltage Controllers

T. Section 26 36 00 - Transfer Switches

U. Section 26 43 00 - Transient Voltage Suppression (TVSS)

V. Section 26 50 00 – Lighting

1.03 RELATED WORK:

A. General: See all other portions of these Contract Documents and apply to those portions of work, relating to Electrical Work, the same as if repeated herein in its entirety. The Division 26 Electrical Trade shall allow for wiring and controlling all equipment requiring electrical connections as described therein even though not shown on the electrical drawings. The Division 26 Electrical Trade shall provide and install all conduits, standard boxes and grounding for Divisions 27 and 28 Trades. Divisions 27 and 28 Trades shall provide all special boxes, cabinets and enclosures to Division 26 Electrical Contractor for installation. The Division 26 Electrical Contractor shall coordinate with Divisions 27 and 28 Trades for sizes and locations of

conduits, boxes, cabinets and enclosures required by Divisions 27 and 28 Trades. The Division 26 Electrical Trade shall provide and install all conduits, standard boxes, cable trays, and grounding for Division 27 & 28 Trades.

B. Section 07 80 00 - Firestopping

C. Section 09 90 00 - Painting

D. Division 11 - Equipment

E. Division 14 - Conveying Systems

F. Division 23 – Mechanical

G. Division 21 – Fire Suppression

H. Division 22 – Plumbing

I. Division 27 – Communications

J. Division 28 – Electronic Safety and Security

K. Division 31 - Site Work

1.04 WORK NOT INCLUDED:

A. Certain electrical equipment will be provided in-place as specified under other Divisions of these Contract Documents and other pieces of equipment such as operating controls, etc., will be provided f.o.b. (freight on board) premises, which shall be mounted and connected to electrically under Division 26.

1.05 DRAWINGS:

A. Where conduit, equipment, devices and other electrical appurtenances are shown on the drawings, the general arrangement of such items on the electrical drawings shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the electrical drawings, it is not feasible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.

1.06 QUALITY ASSURANCE:

A. Equipment and material used in the project shall be new and undamaged. The electrical installation shall fit into the space allotted and shall allow adequate, acceptable, clearances for entry, servicing, safety, and maintenance. The Contractor shall coordinate the work to ensure that the equipment may be moved into place without altering building components or other installations. All Electrical work shall be performed by a licensed Texas Electrical Contractor whose technicians, mechanics, or tradesmen shall be skilled in the trade involved. All electrical work shall be performed under the direct supervision of an electrician with a locally recognized and accepted master license.

B. Equipment and material in existing installations may be reused where specifically indicated on the drawings.

1.07 REFERENCES:

A. The complete installation and all materials and equipment under Division 26 shall conform to the International Uniform Statewide Building Code, current issue, including all applicable portions of the National Electrical Code (NEC) and all other governing codes and regulations.

B. All equipment used shall bear the Underwriters Laboratory (U.L.) label for the intended application, or other organizations label if acceptable to the Authority having jurisdiction and concern with product evaluation.

C. In addition, the following codes, standards, and regulations shall apply to the complete installation and all materials and equipment. These are referred to by their accompanying abbreviations.

D. National Electrical Code (NFPA No. 70) 2023 NEC

E. National Electrical Manufacturers Association NEMA

F. Underwriters Laboratories, Inc. UL

G. Telecommunications Building Wiring Standards TIA/EIA

H. All Systems' Installation Certification Compliance Documents for Installing Trades

I. National Fire Protection Association NFPA

J. Uniform Federal Accessibility Standards UFAS

K. Americans with Disabilities Act Accessibility Guideline ADAAG

L. The above standards are intended as a minimum and shall be exceeded if required by the Contract Documents. In the event information contained in the Contract Documents conflicts with one of the above mentioned codes, the codes shall take precedence.

1.08 PERMITS, LICENSES, TAXES AND INSPECTION CERTIFICATES:

A. All permits, bonds, licenses, electrical connection fees, inspection fees and taxes required for the execution of the work shall be obtained and paid for by the Contractor. Under each phase of the Electrical work the Contractor shall furnish three copies of certificates of final acceptance to the Engineer from any inspection authority having jurisdiction.

B. At the completion of the job, provide the Engineer with three (3) copies of an electrical inspection certificate from the local Electrical Inspector, if such inspection is provided and/or required by the locality.

C. All bonds, licenses, and electrical connection fees, inspection fees, and taxes required for the execution of the work shall be obtained and paid for by the Contractor. The contractor is advised that since this project is on State property, Building Codes and Zoning Ordinances of local political sub-divisions do not legally apply. Building permits required by the locality consistent with the Governors memorandum of September 11, 1973, will be obtained and paid for by the Owner.

1.09 REGULATIONS AND STANDARDS:

A. The completed installation and all materials and equipment shall conform to local ordinances and codes, other regulations and standards listed herein or in related sections. These are intended as a minimum and shall be exceeded if required by the specifications or Drawings. In the event of a conflict between the codes, standards, or regulations, and information contained in the Contract Documents, the applicable code, standard, or regulation shall take precedence.

1.10 SUBMITTALS:

A. Submit shop drawings, product data and samples in accordance with Division 1 for all items as specified in related sections of these specifications. One (1) electronic (PDF) copy of the submittal shall be submitted. One (1) electronic (PDF) copy of the submittal will be returned to the Contractor. If additional copies are required they will be the responsibility of the Contractor. Where drawings are submitted, the Contractor shall submit a minimum of two (2) sets of full scale prints. One (1) copy will be marked and returned to the Contractor, and the Contractor shall be responsible for all additional copies required for his use. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements.

Contractor's stamp shall identify the paragraph and page number for which the submittal is being made. Any submission which has not been reviewed and stamped by the Electrical Trade will not be reviewed by the Engineer. No reviews prior to award of Contract will be considered or accepted.

B. Shop drawings, samples, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these contract documents shall be submitted as follows:

C. All the equipment and materials where submissions are specifically required by other Divisions of these Contract Documents.

D. All the equipment and materials that are indicated with an [S] behind the product title. This shall include submission of the specified products equipment and materials.

E. All the equipment and materials that are acceptable equal substitution.

F. If submission is NOT required for the SPECIFIED products "shop drawings and product data" under 1. and 2. above, the Contractor shall NOT submit a shop drawing for the SPECIFIED products.

G. Samples, in good working order, shall be submitted in accordance with Division 1, complete with all installation and service drawings and instructions. All samples will be returned at the submitter’s expense unless otherwise indicated. Samples may be subject to destructive testing by the Architect/Engineer.

H. Operation and Maintenance manual(s) shall be submitted in accordance with Division 1 and shall include a complete product index, a copy of all accepted shop drawings, installation and maintenance data, sequence of controls, parts lists, and the name, address and telephone number of supplier or nearest representative. All electrical devices, equipment and systems marked [O/M] in these specifications shall be included and all other such electrical items which will require servicing before the duration of its useful life has been reached. The manual(s) shall be presented to the Engineer for review and transmitted to the Owner before the final payment is recommended.

I. Equivalents: Manufacturers, trade names and model numbers indicated herein and on drawings shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Unless definitely stated otherwise and upon complying with Division 1, the Contractor may use any article of equal appearance which, in his judgment is equal to that specified and is accepted by the Engineer. Where three or more manufacturers are named in the specifications for any item, the Contractor should use one of the manufacturers. No others shall be reviewed or accepted. Manufacturers listed first in these specifications and on drawings were used as a basis of design. It will be the responsibility of the Contractor to verify all connections, physical sizes and capacities of all other manufacturer's items, both items named herein, or items proposed. If the equipment necessitates changes in power distribution, conduit, wiring, lighting, ductwork, piping, or any other building systems from that indicated on the drawings, the Contractor shall be responsible for all additional costs included and notify other trades of the changes. Where such changes are required, detail drawings indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval. See Division 1 for substitutions.

J. The ten day prior approval requirements of The Instructions to Bidders, AIA 701, are waived for this Division of the Specifications, and unless stated otherwise the Contractor may use items that he deems as equivalent in quality and performance to the specified item subject to final acceptance of substituted items by the Engineer upon his review of shop drawings. (This paragraph cannot be used with BCOM jobs!)

K. Guarantee: Electrical equipment, materials and labor required by these specifications and accompanying drawings shall be guaranteed to be free from defective materials or workmanship, including lamps, for a period of one year after final acceptance of the project except extended warranties as specified elsewhere in these documents on specific items of

equipment will be furnished by the Trade providing the equipment. Defects in material or workmanship occurring during this period shall be corrected with new material and equipment or additional labor at no cost to the Owner. Manufacturer's certificates of warranty shall be transmitted to the Owner before final payment is recommended.

1.11 WARRANTIES:

A. The Contractor shall warrant for a period of one year all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.

B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.

C. Refer to Division 1 for additional warranty requirements.

D. Information on all warranties shall be included in the O&M Manuals specified herein to be provided to the Owner.

1.12 EXCAVATION AND BACKFILLING:

A. General: Excavation and backfilling shall be as specified in Division 31. Backfilling shall not commence until all tests have been performed and all utility systems conform to the contract documents.

B. Protection of Existing Utilities: Existing utility lines to be retained, whether known or unknown and uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be restored to original condition.

C. General: The Electrical Trade shall perform all excavations of every description and of whatever substances encountered, to the depths required for installation of his work. (No extras will be allowed for rock.) All excavated materials not required or suitable for backfill shall be removed and wasted as indicated on the drawings or as directed by the Engineer. OSHA approved shoring methods shall be provided as necessary to protect existing facilities, new work and the safety of personnel. Excavation shall be open cut except that short sections of a trench may be tunneled if the conduit can be properly installed. Backfilling shall not commence until all tests have been performed and all utility systems conform to the contract documents. Refer to Section 26 05 43 for detailed specifications.

D. Protection of Existing Utilities: Existing utility lines to be retained, whether known or unknown and uncovered during excavation operations, shall be protected from damage during excavations and backfilling, and if damaged, shall be restored to original condition.

1.13 COORDINATION OF WORK:

A. General: The contract documents indicate the extent and general arrangement of the electrical systems. The Contractor shall be responsible for the coordination and proper relation of the electrical work to the building structure and to the work of other trades. No additional compensation or extension of completion time will be granted for extra work caused by the lack of coordination.

B. Miscellaneous loads, such as control panel power, are not always shown on the Drawings. Where additional circuits are needed for such loads, extend wiring to the load from the nearest electrical panel serving receptacle loads and connect to a spare circuit breaker. Where an emergency generator is present and the device to be served is for a controls system or component, the circuit shall be derived from a panelboard fed by the emergency generation optional/standby (NEC 702) system.

C. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, the building construction.

D. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the electrical drawings are intended only as a guide to indicate relative locations of the electrical work. Refer to architectural and structural drawings for building construction details. If conflicts prevent installation of electrical work at the locations indicated, minor deviations shall be made subject to acceptance by the Engineer, and without additional compensation.

E. Cutting and Patching: Unless stated otherwise, the Electrical Trade shall do all cutting necessary for the installation of his work. All work should be installed sufficiently in advance of new construction in order to permit installation of supports, sleeves, and similar items without cutting. Cutting which will in any way affect the building structure shall not be performed without permission of the Architect-Engineer. The Electrical Trade is responsible for patching where he does cutting. Patching shall be done to the satisfaction of the Architect-Engineer.

F. Roughing-In: Receptacles, switches, and other similar items shall align vertically or horizontally with each other, hose bibbs, thermostats, the building structure and features thereof when it appears obvious and logical that they should. All mounting heights shall be within the limits of the 2024 International Building Code and ADAAG.

G. Damage to Other Work: The Electrical Trade is responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Trade who installed the work, and as directed by the Architect-Engineer; the cost of which shall be paid for by the Electrical Trade.

1.14 ASBESTOS:

A. Asbestos Free Materials: The intention of these drawings and specifications is that there be no asbestos containing materials installed on this project. To the best of the Architects' and Engineers' knowledge, none of the material or equipment specified herein or shown on the drawings contains asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos containing materials were used for or in the construction of this project.

B. Existing Materials:

C. Discovery: If during the construction of this project, work involving friable asbestos is suspected, or encountered, all work in this area shall be discontinued and the Owner or the Owner’s representative, shall be notified immediately and the Owner with his own forces or by separate contract shall be responsible for complete investigation, removal, and disposition of the friable asbestos hazard in accordance with applicable laws and regulations. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the contract documents.

D. Removal: All work involving the removal of friable asbestos will be done under a separate contract.

1.15 GRAPHICS DATABASE:

A. This project’s Computer Aided Design & Drafting (CADD) drawing files may be purchased directly from the Engineer for use in preparing computer graphics specific to this project. See Appendix A at the end of this Section for Letter of Indemnification and ordering instructions.

1.16 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY ALLOWANCES:

A. Contractor shall provide the following allowances for the respective project types to offset any modifications required by the study:
   1. Elementary School - $15,000.00
   2. Middle School - $25,000.00
   3. High School - $35,000.00

B. If the respective allowance is not used, the allow shall be retained by the Owner.

(Spec. Writer verify and coordinate the proper allowance with the Architect for use in the frontend documents under allowances.)

1.17 SEISMIC RESTRAINTS [S]:

A. This structure has been determined to be in Seismic Hazard Exposure Group and Seismic Performance Category ___ as defined by the 2024 International Building Code, with Amendments. All Division 26 systems, components and their attachments shall be designed and constructed to resist seismic forces according to the formulae listed in the VUSBC. Shop drawings shall detail each type of seismic restraint and shall include all supporting calculations signed and sealed by a professional seismic engineer currently licensed by the State of Texas. Systems exempted by the IBC need not be provided with seismic restraints. Restraints shall include, but not be limited to, snubbers, sway bracing, and anchors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND MATERIALS:

A. General: Manufacturers and materials shall be as specified in subsequent sections of these specifications and as noted on the drawings. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise.

2.02 SLEEVES AND INSERTS:

A. General: Sleeves and inserts shall be provided and correctly located in the structure, as required for the work.

B. Inserts shall be steel and of proper size for loads encountered.

2.03 ACCESS DOORS:

A. Provide for all junction boxes or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for work shall be furnished as a part of this Division to the General Contractor for installation. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction. Doors occurring in rated construction shall be fire rated U.L. labeled access doors correlated to preserve the integrity of the rated construction. Doors shall be prime finish steel except those in toilets, shower rooms, locker rooms, kitchens and other similar areas shall be aluminum with natural anodized finish. Doors shall match the access doors in Division 23 and meet the acceptance of the Architect.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General: Materials and equipment shall be installed in accordance with manufacturer's instructions to conform to the details and application as specified in subsequent sections of these specifications and indicated on the drawings.

B. Supports: Provide necessary supports for all equipment and appurtenances as required; this includes, but is not limited to, frames or supports for items such as switchboards, panelboards, lighting fixtures, disconnect switches, junction boxes, conduit, motor starters, outlet boxes, and other similar items requiring supports. Floor mounted equipment in Equipment Rooms shall be set on 4-inch high concrete foundation pads unless shown otherwise. All concrete pads shall have 1” chamfered corners and edges. Foundation drawings, bolt setting information and foundation bolts shall be furnished by the subcontractors furnishing the equipment that is

required to have concrete foundations. Concrete for foundations shall be provided by the Electrical Trade and in accordance with Division 03 - Concrete Work, unless noted otherwise.

C. Sleeves: Provide sleeves for all conduits passing through concrete or masonry walls, partitions, concrete slabs or beams installed during construction of the wall, partition, slab or beam. Sleeves placed horizontally in walls or in any position in beams shall be standard weight ASTM A53 steel pipe of length equal to the thickness of the wall or beam. Those placed vertically in non-waterproof floors shall be 20 gauge galvanized sheet steel of length equal to the thickness of the slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. Sleeves occurring in floors of rooms where hose bibbs or floor drains provided under Division 21 occur, and in pipe spaces, shall be standard weight steel pipe projecting 1/2" above finished floor except in Equipment Rooms they shall project four (4) inches above finished floor. Sleeves in floors with waterproof membrane shall be provided with flanges or flashing rings and shall be clamped or flashed into the membrane. All sleeves shall be of sufficient diameter to allow installation of conduit except sleeves on lines subject to movement, which shall clear the conduit at least one inch all around. Conduits through exterior walls, or floors, below grade shall have seals specified in Section 26 05 33 between the conduit and wall sleeve. Sleeve shall have anchor and water stop plate. The entire assembly shall be tightened and adjusted to make watertight. Sleeves for insulated wiring and conduit, penetrating fire (and smoke) rated partitions, walls and floors shall have seals as specified in Section 26 05 33 and shall be sealed in accordance with the terms of U.L. Listed Through-Penetration Firestop Systems (XHEZ) as published in the U.L. Fire Resistance Directory. Penetrations shall exactly conform to details of the Firestop System indicated for the type of partition, wall and floor construction encountered. All penetrations through nonfireresistance rated floor assemblies and through the ceiling membrane of nonfireresistance rated roof assemblies shall be fireblocked with tightly packed mineral-wool insulation secured in place. All penetrations through equipment room walls and other areas of noise or heat generation shall be tightly sealed with mineral fiber rope. All penetrations through draftstop partitions shall be sealed to maintain the integrity of the partition. All firestopping of sleeves for electrical work shall be provided under Division 26.

D. Temporary Requirements: Openings in equipment shall be kept capped at all times until connection is made to the system. The ends of all conduits and equipment openings shall be kept capped properly with approved devices. Approved devices are items such as specially molded plastic caps and sheet metal caps.

E. Access Doors: Provide access doors for all concealed electric equipment, pull boxes, junction boxes or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for Electrical work shall be furnished by the Electrical Trade, to the Contractor for installation. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable.

F. Painting: All work under this Division shall be painted in accordance with Section 26 05 53, Identification for Electrical Systems. Division 26 shall also paint and identify all conduits and boxes for Divisions 27 & 28 as described in Section 26 05 53.

3.02 EXISTING WORK AND DEMOLITION:

A. Electrical Demolition: Remove all existing electrical conduits, wiring, junction boxes, outlets, lighting fixtures, wiring devices, unused panelboards, etc., indicated for demolition. Additional amounts of demolition may be required to accommodate desired renovations and new construction. Not all demolition may be shown on the drawings. All existing electrical equipment not indicated for demolition shall remain in place. Were an existing conduit, wire, or any other item is passing through a rated assembly is to be removed; the assemblies shall be patched in accordance with UL so as to maintain the integrity of the assembly.

B. Equipment and Fixtures Removed: The Owner will select and retain such existing electrical equipment and materials which are indicated to be removed and not reused, as he desires. All

other existing equipment and materials indicated to be removed, and not reused shall become the property of the Contractor, who shall remove them from the premises within the time frame specified under other Divisions of this Contract Document.

C. Equipment and Fixtures Relocated: All existing lighting fixtures, panelboards and other electrical equipment and materials indicated to be relocated shall be disconnected, removed, and relocated. All electrical equipment and materials shall be protected from damage during demolition. Install new phase, neutral and grounding conductors, if grounding conductor is not already present, in each feeder and branch circuit to be reworked, from the panelboard to the outlet.

D. Power Interruption: Attention is called to the fact that the existing facility shall remain in operation throughout the construction period. All necessary temporary arrangements shall be made as required to keep all electrical circuits in continuous operation during this period except for scheduled outages for circuit change-overs. The outage shall be kept to the minimum and carefully scheduled to suit the Owner.

E. Mechanical Equipment: All existing mechanical equipment being removed or relocated under this contract shall be disconnected electrically, both power and control wise, so that the Mechanical Trade can remove or relocate same.

F. Miscellaneous: In all altered portions of the buildings, the Electrical Trade shall remove or alter as necessary all existing electrical work that does not fit with the new construction. All existing work or areas that are not altered shall be reconnected as required. Where indicated changes to non-electrical facilities require minor electrical changes, these changes shall be accomplished even if not specifically indicated. Only a small portion of the existing work is shown on the drawings. Contractors submitting proposals shall visit the site to determine the scope of work under this heading as no additional compensation will be granted because of existing conditions even though the existing conditions may not be indicated on the drawings. Contractor shall thoroughly inspect the electrical systems in reworked areas and bring to the attention of the Engineer all defective or unserviceable material not scheduled for removal or replacement. Demolition shall not begin until the work schedule is approved by the Owner. The work shall be scheduled to prevent any disruption to the normal operations of the building. Refer to other Divisions for work phasing.

3.03 FIELD QUALITY CONTROL:

A. System Readings: Certain system voltage and current readings shall be taken, the values recorded and submitted in triplicate to the Engineer. Two complete sets of readings are required, one under no load and one under maximum available load. The current and voltage shall be recorded on each phase (plus voltage between all phases) at main panelboard and at each branch circuit panelboard. Additional spot readings shall be made if required. Resistance of grounding system shall be tested and recorded. Forms for submitting this report may be obtained from the Engineer's office. A sample form is bound herewith.

B. Equipment Readings: Voltage and amperage readings on each phase of each motor circuit and each resistance heater circuit installed under this contract shall be measured, the values recorded, and submitted in triplicate to the Engineer. Also record motor nameplate data, actual motor heater protective device ratings and all other data necessary for selection of heater device.

C. Verification [V]: Upon completion of the project, the Contractor shall submit a separate letter of certification (or compliance) to the Owner/Architect/ Engineer that each of the following systems or equipment functions properly, conforms to all requirements of these specifications and all requirements of the manufacturer of the systems.

D. Section 26 50 00, Lighting.

E. Section 26 20 00, Low Voltage Electrical Distribution

F. Section 26 32 13, Engine Generators

G. Section 26 36 00, Transfer Switches

3.04 MANUFACTURER'S ASSISTANCE:

A. Qualified technical representatives of manufacturers shall be available to visit the project and provide required assistance for any problems or trouble areas of any systems, material or equipment used in the project. Manufacturer's engineering assistance shall also be available for above problems or trouble areas. The Contractor shall purchase all materials, equipment or systems with these services included in the purchase price or otherwise be prepared to have the above service provided when needed or requested by the Engineer without additional compensation. Where one manufacturer's equipment constitutes the majority of the components or devices to make a system, the manufacturer's technically qualified representative shall inspect and accept the completed installation whether or not especially requested by the Engineer.

3.05 INSTRUCTION OF OWNER'S REPRESENTATIVE:

A. The Electrical Trade shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the Electrical systems. Competent representatives of the Contractor shall spend such time as necessary to fully prepare the Owner to operate and maintain the Electrical systems.

3.06 CONSTRUCTION STATUS REPORT:

A. Each item of discrepancies noted on Construction Status Report prepared by the Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

3.07 RECORD OF UNDERGROUND LINES:

A. On completion of the project, the Contractor shall prepare and submit to the Architect-Engineer a drawing on tracing paper and one full-size print to show the location of any underground lines installed in locations different from those on the Architect-Engineer's drawings. The location and the distance from the building to outside lines and manholes shall be dimensioned.

3.08 DESCRIPTION OF ALTERNATES:

A. Refer to the other Divisions of this Contract Specification (Manual) for description of alternates. (On BCOM projects, use the words “additive bid items”.)

3.09 SCHEDULE OF ABBREVIATIONS:

Electrical Abbreviations:

A	-	AMP	EN	-	EXISTING OUTLET WITH A NEW DEVICE AND WIRING	MP SW	-	MOTOR PROTECTIVE SWITCH
ABV	-	ABOVE				MS	-	MOTOR STARTER
AC	-	AIR CONDITIONING OR ARMOR CLAD	ENG	-	ENGINE	MTD	-	MOUNTED
ACB	-	AIR CIRCUIT BREAKER	EO	-	EXISTING OUTLET	MTS	-	MANUAL TRANSFER SWITCH
			EQUIP	-	EQUIPMENT			
ACI	-	AMERICAN CONCRETE INSTITUTE	EP	-	EXPLOSION-PROOF	MW	-	MEGAWATTS
			EP SW	-	ELECTRO-PNEUMATIC SWITCH	NC	-	NORMALLY CLOSED
						NCS	-	NURSES CALL SYSTEM
ACS	-	ABOVE COUNTER SPLASHBACK	ER	-	EXISTING RELOCATED	ND	-	NEW DEVICE IN EXISTING OUTLET
ADAAG	-	AMERICANS WITH DISABILITIES ACT	ERL	-	ENVIRONMENTAL RESEARCH LABS	NEC	-	NATIONAL ELECTRIC CODE
AEIC	-	ASSOC OF EDISON ILLUMINATING CO'S.	ESC	-	ELECTRIC SEQUENCE CONTROLS	NEMA	-	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
AFF	-	ABOVE FINISHED FLOOR	ETL	-	ELECTRICAL TESTING LAB			
ANSI	-	AMERICAN NATIONAL STANDARDS INSTITUTE	EWC	-	ELECTRIC WATER COOLER	NESC	-	NATIONAL ELECTRICAL SAFETY CODE
			EXP	-	EXPANSION			
ASME	-	AMERICAN SOCIETY OF MECHANICAL ENG.	FA	-	FIRE ALARM			
			FIN FL	-	FINISHED FLOOR	NFPA	-	NATIONAL FIRE PROTECTION ASSOC
			FIXT	-	FIXTURE			
ASTM	-	AMERICAN SOCIETY FOR TESTING AND MATERIALS	FL	-	FLOOR	NIC	-	NOT IN CONTRACT
			FLA	-	FULL LOAD AMPS	NEUT	-	NEUTRAL
			FLUOR	-	FLUORESCENT	NO	-	NORMALLY OPEN
ATS	-	AUTOMATIC TRANSFER SWITCH	FS	-	FILLER SECTION	OCB	-	OIL CIRCUIT BREAKER
			FU	-	FUSE			
AUTO	-	AUTOMATIC	GBM	-	GROUND BUS MODULE	OPR	-	OPERATED
AUX	-	AUXILIARY				OS	-	OIL SWITCH
BALL	-	BUILDING ACOUSTICS AND LIGHTING LABS	GEC	-	GROUNDING ELECTRODE CONDUCTOR	OSHA	-	OCCUPATIONAL SAFETY & HEALTH ACT
BAT	-	BATTERY						
BIL	-	BASIC INSULATION LEVEL	GEN	-	GENERATOR	P	-	POLE
			GF	-	GROUND FAULT	PA	-	PUBLIC ADDRESS
BOCA	-	BUILDING OFFICIALS AND CODE ADMIN.	GND	-	GROUND	PB	-	PULLBOX
			GRS	-	GALVANIZED RIGID STEEL CONDUIT	PC	-	PHOTOCELL (PEC)
						PD	-	PLUG DUCT
BRK	-	BREAKER	HOA	-	HAND-OFF-AUTOMATIC	PE	-	PNEUMATIC ELECTRIC
CAP	-	CAPACITORS						
CABO/MEC	-	COUNCIL OF AMER. BLDG. OFFICIALS MDL	HP	-	HORSEPOWER	PM	-	PLUG MOLD
			HPS	-	HIGH PRESSURE SODIUM	PNL	-	PANEL
CB	-	CIRCUIT BREAKER (CRT BRK)				PS	-	PLUG STRIP
			HV	-	HIGH VOLTAGE	PT	-	POTENTIAL TRANSFORMER
CBM	-	CERTIFIED BALLAST MANUFACTURERS	HW	-	HOT WATER			
			HZ	-	HERTZ	PW	-	PART WINDING (MOTOR STARTER)
CCCT	-	CROSS CURRENT COMPENSATION TRANSFORMER	IB	-	IN BASEBOARD			
			IBS	-	IN BASE OF SHELVES	PWR	-	POWER
CF	-	COIL FAN	ICEA	-	INSULATED CABLE ENGINEERS ASSOCIATION	R	-	REMOVE
CMU	-	CONCRETE MASONRY UNIT				RR	-	REMOVE & REINSTALL
CND	-	CONDUIT (COND)	ICL	-	IN COUNTER LIP	R&C	-	REMOVE DEVICE & CAP OUTLET
CNDCT	-	CONDUCTOR	ICS	-	IN COUNTER SPLASHBACK			
COMB	-	COMBINATION				REC	-	RECEPTACLE
CONC	-	CONCRETE	IEEE	-	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENG'S	RHC	-	RE-HEAT COIL
CONTR	-	CONTRACTOR				RLY	-	RELAY
CPT	-	NEUTRAL GROUNDING TRANSFORMER	IGC	-	ISOLATED GROUNDING CONDUCTOR	SEC	-	SECONDARY
						SGA	-	SURGICAL GAS ALARM
CRT	-	CIRCUIT				S/N	-	SOLID NEUTRAL
CS	-	CORNER SECTION	IMC	-	INTERMEDIATE METAL CONDUIT	S/O	-	SPACE ONLY
CT	-	CURRENT TRANSFORMER				SP	-	SINGLE POLE
			INCAND	-	INCANDESCENT	ST	-	SINGLE THROW
CUH	-	CABINET UNIT HEATER	INTLK	-	INTERLOCK	SURF	-	SURFACE
			IBC	-	INTERNATIONAL BUILDING CODE	SUSP	-	SUSPENDED
CW	-	COLD WATER				SW	-	SWITCH
DB	-	DOORBELL	ITL	-	INDEPENDENT TESTING LABORATORIES	SYNCH	-	SYNCHRONIZE
DF	-	DRINKING FOUNTAIN				TC	-	TIME CLOCK
DH	-	DOOR HOLDER				TEL	-	TELEPHONE
DISC SW	-	DISCONNECT SWITCH (D.S.)	JB	-	JUNCTION BOX	TIA	-	TELE-COMMUNICATIONS INDUSTRY ASSOC
			KV	-	KILOVOLTS			
DO	-	DRAW OUT	KVA	-	KILOVOLTS-AMPS			
DP	-	DOUBLE POLE	KVARS	-	KILOVAR	TRANS	-	TRANSFORMER (XFMR)
DT	-	DOUBLE THROW	KW	-	KILOWATT			
DW	-	DISHWASHER	LA	-	LIGHTNING ARRESTOR	TYP	-	TYPICAL
E	-	EXISTING (EXST)				UCL	-	UNDER COUNTER LIP
EA	-	EACH	LV	-	LOW VOLTAGE	UFAS	-	UNIFORM FEDERAL ACCESSIBILITY STANDARDS
EC	-	ELECTRIC CONVECTOR	MAX	-	MAXIMUM			
			MC	-	METAL CLAD			
EEI	-	EDISON ELECT. INST.	MDH	-	MAGNETIC DOOR HOLDER	UH	-	UNIT HEATER
EGC	-	EQUIPMENT GROUNDING CONDUCTOR				UL	-	UNDERWRITERS LAB
			MECH	-	MECHANICAL	UV	-	UNIT VENTILATOR
			MFG	-	MANUFACTURER	V	-	VOLT
EIA	-	ELECTRONIC INDUSTRIES ASSOC.	MIN	-	MINIMUM	W	-	WATTS
			MH	-	MANHOLE	WH	-	WALL HEATER
ELEC	-	ELECTRIC	MO	-	MOTOR OPERATED	WM	-	WIRE MOLD
			MOD	-	MOTOR OPERATED DAMPER	WP	-	WEATHERPROOF
						Y	-	WYE
EMER	-	EMERGENCY (EM)						
EMT	-	ELECTRICAL METALLIC TUBING	MP	-	MAIN PANEL	ı	-	PHASE

END OF SECTION

ELECTRICAL TEST DATA REPORT

Stratus
5228 Valleypointe Pkwy, Suite #4
Roanoke, VA 24019

PROJECT: _____
_____
_____
_____

Electrical Contractor: _____
Date tests were made: _____ Date Submitted: _____

Current Characteristics: _____Volts _____ Phase _____ Wires

Type voltmeter used: _____ When calibrated:_____
Type ammeter used: _____ When calibrated:_____

Service ground - Resistance in ohms _____
Resistance test must be made with hand crank, magneto type, megger.

PANEL	VOLTAGE - NO LOAD		VOLTAGE - MAX. LOAD		MAX. LOAD AMPERAGE			
	PH TO PHASE	PHASE TO GND	PHASE TO PHASE	PH - GND	PH A	PH B	PH C	NEUT

MOTOR OVERLOAD PROTECTION

REQUIRED ON ALL PHASES
(SEE N.E.C. SECT. 430 FOR
MAX. PERCENT ALLOWABLE)

PROJECT:

CONTRACTORS:

GEN.:

MECH.:

ELEC.:

DATE:

NOTES:

1. IDENTIFY EACH MOTOR THUS: CWP-1, H&V-1, F-1, ETC. SAME AS SHOWN ON DWGS.
2. SMALL MOTORS MAY BE RATED THUS: HP, WATTS OR FLA.
3. ALL DATA BY ELECTRICAL CONTRACTOR.
4. SERVICE FACTOR -- IF NOT AVAILABLE ENTER DEGREE C. RISE.
5. MOTOR CONTROLLER TYPE -- FVNR, RVPW, 2-SPD/1W, 2-SPD/2W, Y/Δ, MANUAL, ETC.
6. MOTOR PROTECTION -- INCLUDE COPIES OF HEATER TABLES WITH THIS REPORT.

EQUIP. MARK (1)	MOTOR DATA						MOTOR CONTROLLER		N.E.C.	MOTOR PROTECTION (6)		
	HP (2)	VOLTS	PHASE	N'PLATE AMPS	SERVICE FACTOR (4)	RUN AMPS*	TYPE (5)	NEMA SIZE	MAX. % ALLOWED	MIN. & MAX. AMPS	HEATER NO.	MFGR.

*AS MEASURED WITH AMMETER AT SITE.

APPENDIX A
LETTER OF INDEMNIFICATION

Project Name:

Project Location:

At the Contractors request, Stratus will provide electronic files of the Revit Models for their convenience and use, subject to the following terms and conditions:

Stratus electronic files are compatible with Autodesk Revit Product version for which they were designed. Autocad files will be provided in the Autocad 2018 DWG format. Stratus makes no representation as to the compatibility of these files with your hardware or your software.

Data contained on these electronic files is part of Stratus's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of project layout for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to Stratus. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Stratus, its officers, directors, employees, agents, or subconsultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless Stratus from all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to Addenda, Change Orders, or other revisions. Stratus makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed documents prepared by Stratus and the electronic files, the signed Contract Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm, and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

The use of the Revit Model files prepared by the Engineer shall not in any way negate the Contractor's responsibility for coordination with other trades or for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

All information added to the drawings by the Contractor shall be in a distinctively heavier pen weight and different font, such that all Contractor information can be clearly distinguished from the original files.

Any information added by the Contractor, which represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, Stratus reserves the right to remove all indicia of its ownership and/or involvement for each electronic display.

Under no circumstances shall delivery of the electronic files for use by you deemed a sale by Stratus, and Stratus makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall Stratus be liable for any loss of profit or any consequential damages.

The Engineer believes that no licensing or copyright fees are due to others on account of the transfer of the Revit Model files, but to the extent any are, the Contractor will pay the appropriate fees and hold the Engineer harmless from such claims as may arise.

Any purchase order number provided by the Contractor is for the Contractor's accounting purposes only. The Contractor's purchase order terms and conditions are void and are not a part of this agreement.

The Recipient further agrees that the drawing files will only be used in graphics preparation for the above-referenced project.

Company Name of Recipient: _____

Recipient's Designated Representative: _____

Title: _____

Signature: _____

Address: _____

Return to: Stratus
5228 Valleypointe Parkway, Suite 4
Roanoke, VA 24019
Stratus # 2026-0302

SECTION 26 0519

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Wires and Cables, Under 600 Volts.

B. Connectors and Lugs, Under 600 Volts

1.03 RELATED WORK:

A. Division 23 – Mechanical

B. Section 26 05 00 – Common Work Results For Electrical

C. Section 26 05 26 – Grounding And Bonding For Electrical Systems

D. Section 26 05 33 – Raceway And Boxes For Electrical Systems

E. Section 26 05 36 – Cable Management For Electrical Systems

F. Section 26 05 53 – Identification For Electrical Systems

G. Section 26 20 00 – Low-Voltage Electrical Distribution

H. Division 27 – Communications

I. Division 28 – Electronic Safety and Security

1.04 REFERENCES:

A. All wire, cables, connectors and lugs shall be U.L. listed for the application intended, and meet NEMA applicable standards.

B. All wiring methods shall meet with NFPA applicable codes.

1.05 CONDUCTOR CODING: (208Y/120-Volt)

A. Color Code Conductors of 208Y/120-volt system power and lighting conductors as follows:

Neutral	White
Ground	Green
Phase A	Black
Phase B	Red
Phase C	Blue

B. No. 12 and No. 10 conductors shall have continuous insulation color. Color code conductors larger than No. 10 which do not have continuous insulation color by application of at least two laps of colored tape on each conductor at all points of access. Tape shall be “Scotch,” “Highland,” or “Timflex,” vinyl plastic electrical tape No. 35, or accepted equal. Wrap-around "Brady" markers or shrinkable PVC sleeving with hot-stamped lettering may be used and shall state the appropriate conductor identification.

C. Number code all control and instrumentation wiring at all points of access.

1.06 CONDUCTOR CODING (208Y/120 and 480Y/277 Volt)

A. Color Code Conductors of 208Y/120-volt system power and lighting conductors as follows:

Neutral	White
Ground	Green
Phase A	Black
Phase B	Red
Phase C	Blue

B. Color Code Conductors of 480Y/277-volt system* power and lighting conductors as follows:

Neutral	Grey
Ground	Green
Phase A	Brown
Phase B	Orange
Phase C	Yellow

* Owner's NEC compliant color code may be substituted for the above 480Y/277 code.

C. No. 12 and No. 10 conductors shall have continuous insulation color(s). Color code conductors larger than No. 10 which do not have continuous insulation color by application of at least two laps of colored tape on each conductor at all points of access. Tape shall be "Scotch," "Highland," or "Timflex" vinyl plastic electrical tape No. 35, or accepted equal. The 480Y/277 volt conductors shall be marked with an appropriately wide tape of the above base color and an adjacent narrow tape of yellow. Wrap-around "Brady" markers or shrinkable PVC sleeving with hot-stamped lettering may be used and shall state the appropriate conductor identification. Label "480Y/277-Volt" on all phase conductors of the 480Y/277-volt system.

D. Number code all control and instrumentation wiring at all points of access.

1.07 CONDUCTOR SIZES:

A. All conductor sizes (AWG) are based on copper.

1.08 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. All wires and cables shall be as manufactured by General Cable, Capital Wire & Cable, Carol Cable, American Insulated Wire, Southwire, Senator, Rome, Cerro Wire and Cable, Circle Wire & Cable.

B. All connectors and lugs shall be as manufactured by T & B, Buchanan, 3M, Burndy, or accepted equal.

2.02 MATERIALS AND TYPE:

A. Wiring, Power and Control:
   1. General:
      a. Conductors shall be **soft annealed copper** unless otherwise indicated.
      b. All conductors #8 AWG or larger shall be stranded (except in surface raceway SR, all conductors shall be stranded).
      c. All power wiring shall be #12 AWG minimum unless otherwise indicated.
      d. All control wiring shall be #14 AWG minimum for NEC Class I and #16 AWG minimum for NEC Class II, **extra fine stranding.**
      e. All insulation shall be rated for 600 volts unless otherwise indicated.
   2. Building Wiring: Conductors shall be type "THWN" or "THHN" unless otherwise indicated. "THHN" shall not be used in damp or wet locations.
   3. Underground Wiring (Refer to Part-3 for limitations):

a. #12 AWG through #6 AWG: Conductors shall be type UF copper cable with heat and moisture-resistant insulation, suitable for branch-circuit wiring. The cable shall have an insulated equipment grounding conductor. The overall covering shall be flame-retardant; moisture, fungus, and corrosion resistant; and shall be limited to use within the pole standard.
b. #12 AWG through 500 kcmil (MCM) AWG: Conductors shall be type RHH/USE/RHW stranded copper with Durasheath cross-linked polyethylene, thermosetting XLPE that is heat, fungus and moisture resistant.
c. #12 AWG through 500 kcmil (MCM) AWG: Conductors shall be type XHHW-2 stranded copper cable with cross-linked polyethylene, thermosetting XLPE that is chemical and oil resistant, and suitable for wet or dry locations.

4. Flexible Metal Conduit (Liquidtight) Connections and Motor Starter Enclosures: Power and line voltage control wiring Type MTW stranded copper unless otherwise indicated for all motor connections, HVAC equipment, transformers, all other equipment subject to movement and vibration, and motor starter enclosures.
5. Flexible Cable:
   a. Shall be hard service cord, type "SO" with equipment ground conductor in addition to normal current carrying conductors, and "safety-yellow" jacket.
   b. Connectors shall be Crouse-Hinds series CG, Appleton, Kellems, O.Z./Gedney, Raco, or T & B, complete with locknut, sealing gasket, gland nut and tapered neoprene bushing.
   c. In hazardous areas, connectors shall be Crouse-Hinds CGBS.

B. Motor Connections:
1. Connection lugs shall be Thomas and Betts, Series 54200.
2. Insulation shall be motor stub splice insulators, Thomas and Betts, Series MSC, or Raychem MCK.

C. Connectors and Lugs, 600 Volts and Under:
1. Material: Copper, or suitable copper alloy, for all current carrying parts and all parts coming in contact with conductors.
2. Connectors and Lugs, No. 8 and Larger Conductors: Compression type T & B "Color-Keyed", or accepted equal by Burndy or Kearney. Mechanical compression lugs furnished with equipment are acceptable. Provide insulating covers or heat shrinkable insulators where required.
3. Connectors, No. 10 and Smaller Conductors: Permanently indented self-insulated pressure connectors T & B, Buchanan, or accepted equal. Snap-on insulating caps are acceptable insulation. "Scotch-loks" by the 3M Company, "Wing-Nut" by Ideal, "Legrands" by Pass & Seymour (P&S) are acceptable wing type wire connectors.
4. Lugs, No. 10 and Smaller Conductors: Permanently indented or compression type by Buchanan, Burndy, T & B, or accepted equal. Washer head screw terminals without lugs are acceptable on neutral bars, circuit breakers, wiring devices and other equipment, unless otherwise indicated. Mechanical compression lugs furnished with equipment are acceptable.
5. Exterior Splices: Compression type T & B "Color-Keyed", complete with T & B Shrink-Kon series HS heat shrinkable insulators or accepted equal by Burndy or Kearney.
6. Connectors and Lugs, Aluminum: All connectors, lugs and fittings shall be UL listed for use with aluminum alloys, and aluminum to copper alloys where encountered.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Clean out raceway system before pulling wire.

B. Thoroughly inspect all existing raceway systems for burrs, deformation, rust, water, and other hazards. Inform Architect/Engineer in writing of any raceway conditions that would be detrimental to wiring, or not in compliance with Codes or practices. All existing raceways shall meet the requirements of Section 26 05 33.

C. Utilize an approved compound as required to facilitate pulling wires and cables, unless otherwise indicated.

D. 600 Volts and Under Wiring Methods:

1. Conductor Ties:
   a. Inside each enclosure, other than outlet and junction boxes, conductors shall be bundled and trained utilizing T & B "Ty-Rap", 3M Brand Cable Ties, Tyton Cable Ties, or accepted equal, ties. All Switchboards, Panelboards, Motor Starters, Disconnects, etc. require at least one (1) conductor tie for each circuit entering and each circuit leaving the Switchboard, Panelboard, Motor Starter and Disconnect.
2. Conductor Sizes:
   a. Line Voltage Power Wiring: No. 12 AWG minimum. Circuits and feeders larger than 20 amp. to have conductors sized for equal or greater ampacity than their protective device ratings unless otherwise indicated. All wires for 20 amp. circuits shall be #10 on runs 100 feet to 250 feet, #8 on runs 251 feet to 500 feet and #6 on runs 501 feet and above.
   b. Control Wiring:
      1) 120 Volt: If not carrying motor current, No. 14 AWG unless otherwise indicated, or required by load or distance encountered.
3. Terminal Strips: Where equipment does not have terminal strips, provide terminal strips to terminate and splice control, power limited and communication cables. Indicate wire numbers on strip with indelible pen.
4. Conductor Identification:
   a. Wire Markers:
      1) Identify lighting and receptacle branch circuit wiring by panelboard name and circuit number at all accesses.
      2) Identify motor branch circuit wiring by circuit number and phase at all accesses.
      3) Identify feeders by name of equipment from which they originate, circuit number, and phase.
      4) Identify all control wiring with a unique number for each wire.
   b. Color Code: Color code conductors to designate neutral conductor, ground conductor and phase conductors as described in Part 1 of this Section.
5. Splices:
   a. Feeders: Feeder conductors installed between electrical distribution equipment (i.e., switchboards, transformers, and panelboards) shall be free from splices, no exceptions. Any feeder conductor splices proposed by the Contractor shall be approved in advance by the Engineer; otherwise, they are not permitted.
   b. No splices shall be made in any conductor beyond the exterior walls of the Building, except in exterior pull boxes, and where approved by the Engineer.
6. Motor Connections: Shall use connection lugs with motor stub splice insulators.
7. Flexible Cable, Type SO: Flexible cable shall be used to connect portable equipment in kitchens, laboratories, shops, etc., as indicated and limited by the Codes.
8. Each applicable system shall have a separate conduit system unless the applicable system's manufacturer, Codes and Regulations permit other systems conductors to be installed in the same conduit.
9. Type RHH/USE/RHW conductors shall be used for exterior underground lighting branch circuits in schedule 40 PVC conduit. Refer to Section 26 05 43 for the exceptions to the specified complete concrete encasement. Direct burial of the RHH/USE/RHW wire is not permitted. The type UF conductors shall be used within the exterior lighting fixture pole or standard.
10. Type XHHW-2 conductors shall be used for the secondary underground service entrance cables unless otherwise indicated.
11. Test all feeders for IR to NETA ATS standard current revision.

END OF SECTION

SECTION 26 0523

CONTROL VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Power Limited Shielded Cable

1.03 RELATED WORK:

A. Division 23 - Mechanical

B. Section 26 05 26 – Grounding And Bonding For Electrical Systems

C. Section 26 05 33 – Raceway And Boxes For Electrical Systems

D. Section 26 05 36 – Cable Management For Electrical Systems

E. Section 26 05 53 – Identification For Electrical Systems

F. Section 26 20 00 – Low-Voltage Electrical Distribution

G. Division 27 – Communications

H. Division 28 – Electronic Safety and Security

1.04 REFERENCES:

A. All wire, cables, connectors and lugs shall be U.L. listed for the application intended, and meet NEMA applicable standards.

B. All wiring methods shall meet with NFPA applicable codes.

1.05 CONDUCTOR SIZES:

A. All conductor sizes (AWG) are based on **copper**.

B. Number code all control and instrumentation wiring at all points of access.

1.06 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. All connectors and lugs shall be as manufactured by T & B, Buchanan, 3M, Burndy, or accepted equal.

B. All **power limited shielded twisted pair** shall be as manufactured by Manhattan, Belden, Alpha, West Penn, Anixter [S].

2.02 MATERIALS AND TYPE:

A. Wiring, Power and Control:

1. General:

a. All control wiring shall be #14 AWG minimum for NEC Class I and #16 AWG minimum for NEC Class II, **extra fine stranding.**
b. All insulation shall be rated for 600 volts unless otherwise indicated.

2. Plenum rated power limited twisted pair cable.
   a. For Remote Control, Signaling and Power-Limited Circuits as per NEC-725 for Class 2 and 3 circuits.
      1) General: Cable shall be UL classified, Subject 13, non-conduit application in ceiling air plenum in accordance with NEC 725 and as specified below.
      2) Control and Instrumentation (24 volt) (Heating, Ventilating and Air Conditioning): Control and instrumentation (24 volt) shall be the minimum of two (2) #16 twisted pair configuration, type CL2P and CL3P insulated stranded tinned copper conductors with 1-1/2 minimum lay, flame retardant, low smoke insulation as required by Class, insulated jacket, color coded, 100% aluminum polyester tape shield, #18 AWG tinned copper drain wire or as indicated otherwise herein.
      3) Control and Instrumentation (Heating, Ventilating and Air Conditioning): Thermocouple extension wire shall be compatible with the specific thermocouple material and shall have the same features as "(2)", except the wire shall meet ANSI standard MC96.1 (Temperature Measurement Thermocouples) and have proper amount of pairs for the application.
      4) Direct Digital Control System: Wiring between pilot relays, sensors, DDC's and control processing unit shall have proper amount of pairs and be the type as required by Digital Control System installed by temperature control system trade, and shall have similar features of "(2)".
      5) Other Systems: Wiring on the applicable systems load side shall be gauge, pairs and shield as required by the applicable system's manufacturer and shall have similar features as to "(2)". Provide shield if required by applicable system's manufacturer or Codes.
   b. For Telephone, Outside Wiring for Fire Alarm and Burglar Alarm, Telephone-like Systems Circuits per NEC 800:
      1) Cable shall be UL Classified, Subject 13, non-conduit application in ceiling air plenum in accordance with NEC 800.
      2) Cable features shall be twisted pair configuration, type CMP, color coded, solid tinned copper conductor, flame retardant, low smoke insulation, 100% aluminum polyester tape shield complete with tinned copper drain wire. The quantity of pairs, gauge and shielding requirements shall be determined by the applicable system's manufacturer. Provide shield if required by applicable system's manufacturer or Codes.
   c. For Fire Protective Signaling System Circuits per NEC-760:
      1) The cable shall be UL Classified, Subject 13, non-conduit application in ceiling air plenum in accordance with NEC 760 and as specified below.
      2) Cable features shall be twisted pair configuration, type FPLP, color coded, solid tinned copper conductor, flame retardant, low smoke insulation, 100% aluminum polyester tape shield complete with tinned copper drain wire. The quantity of pairs, gauge and shielding requirements shall be determined by the fire alarm system manufacturer. Provide shield if required by the fire alarm system's manufacturer or codes.

3. Power limited twisted pair cable (Not for air plenums):
   a. For Remote Control, Signaling and Power-Limited Circuits as per NEC-725 for Class 2 and 3 circuits.
      1) General: Cable shall be UL classified for non-conduit application in ceiling void (non-air plenum) in accordance with NEC 725 and for application in multi system common raceway in accordance with NEC 725 and as specified below.
      2) Control and Instrumentation (24 volt) (Heating, Ventilating and Air Conditioning): Control and instrumentation (24 volt) shall be the minimum of two (2) #16 twisted pair configuration, insulated stranded tinned copper conductors with 1-1/2 minimum lay, types CL2 or CL3, or riser type cables CL2R or CL3R, as required by Class,

insulated, jacket, color coded, 100% aluminum polyester tape shield, #18 AWG tinned copper drain wire or as indicated otherwise herein.

3) Control and Instrumentation (Heating, Ventilating and Air Conditioning): Thermocouple extension wire shall be compatible with the specific thermocouple material and shall have the same features as "(2)", except the wire shall meet ANSI standard MC96.1 (Temperature Measurement Thermocouples) and have proper amount of pairs for the application.

4) Direct Digital Control System: Wiring between pilot relays, sensors, DDC's and control processing unit shall have proper amount of pairs and be the type as required by Digital Control System installed by temperature control system trade, and shall have similar features of "(2)".

5) Other Systems: Wiring on the applicable systems load side shall be gauge, pairs and shield as required by the applicable system's manufacturer and shall have similar features as to "(2)". Provide shield if required by applicable system's manufacturer or Codes.

b. For Telephone, Outside Wiring for Fire Alarm and Burglar Alarm, Telephone-like Systems Circuits per NEC 800:

1) Cables shall be UL Classified for non-conduit application in ceiling void in accordance with NEC-800 and for application in multi-system common raceway application in accordance with NEC 800.

2) Cable features shall be twisted pair configuration, type CM or CMR, color coded, insulated solid tinned copper conductor, insulated jacket, 100% aluminum polyester tape shield complete with tinned copper drain wire. The quantity of pairs, gauge and shielding requirements shall be determined by the applicable system's manufacturer. Provide shield if required by applicable system's manufacturer or Codes.

c. For Fire Protective Signaling System Circuits per NEC-760:

1) The cable shall be UL Classified for non-conduit application in ceiling void in accordance with NEC 760 and as specified below.

2) Cable features shall be twisted pair configuration, type FPL or riser type FPLR as required, color coded, insulated solid tinned copper conductor, insulated jacket, 100% aluminum polyester tape shield complete with tinned copper drain wire. The quantity of pairs, gauge and shielding requirements shall be determined by the fire alarm system manufacturer. Provide shield if required by the fire alarm system's manufacturer.

4. Terminal Strips shall be 600 volt barrier type with marking strip suitable for marking with indelible pens.
5. Pulling compound shall be U.L. listed.
6. Wire markers shall be wrap-around tags made of shrinkable PVC sleeving with hot-stamped blocks or slip-on beads.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Clean out raceway system before pulling wire.

B. Thoroughly inspect all existing raceway systems for burrs, deformation, rust, water, and other hazards. Inform Architect/Engineer in writing of any raceway conditions that would be detrimental to wiring, or not in compliance with Codes or practices. All existing raceways shall meet requirements of Section 26 05 33.

C. Utilize an approved compound as required to facilitate pulling wires and cables, unless otherwise indicated.

D. 600 Volts and Under Wiring Methods:
   1. Conductor Ties:
      a. All power limited cable shall be bundled and trained for each system in the ceiling voids. Each bundle shall be supported from the structure with proper metallic (Caddy) clamp or hanger at the required distances. Proper type of T & B Halar™ cable ties are permitted for use in air plenums.
   2. Conductor Sizes:
      a. Control Wiring:
         1) 120 Volt: If not carrying motor current, No. 14 AWG unless otherwise indicated, or required by load or distance encountered.
         2) 30 Volts or Under: No. 16 AWG unless otherwise indicated, or required by load or distance encountered.
   3. Control and instrumentation wiring specified in Divisions 21 and 22 shall be furnished and installed by Division 26.
   4. Control and instrumentation wiring specified in Division 23 shall be furnished and installed as follows:
      a. All line voltage control wiring, 101 volts, 60 Hertz or higher voltage shall be provided under Division 26.
      b. All low voltage control raceways and wiring, 100 volts and lower voltages and thermocouple extension wiring, shall be provided under Division 23, according to Section 26 05 33 and Section 26 05 23 product and material requirements, and installation methods.
   5. Direct Digital Control System wiring specified in Division 23 shall be furnished and installed as follows:
      a. All line voltage control wiring, 101 volts, 60 Hertz or higher voltage, wired through the Digital Control System; and 120 volts, 60 Hertz power source wiring to the Direct Digital Control System shall be provided under Division 26.
      b. All low voltage control wiring (100 volts and lower voltages) for the Direct Digital Control System shall be provided under Division 23, in the manner as noted above for control and instrumentation wiring.
   6. Plenum Rated (and Non-Plenum) Power Limited Shielded Twisted Pair Cable:
      a. All plenum rated (and non-plenum) shielded power limited cable shall be installed in accordance with NEC Article 725, 760 or 800 on the "load" side of the applicable system.
      b. Provide proper number, shielding and size of wires as required for operation of the applicable system in accordance with the manufacturer's instructions and applicable NFPA codes.
      c. Raceway Requirements:
         1) Where an accessible ceiling system or demountable partitions are installed; hollow spaces in casework are available; or similar accessible void is available; a conduit system will not be required. If a conduit system is not utilized cables shall be installed using the specified “Open Wire Management” system.
         2) Where cable is in inaccessible ceiling voids, in inaccessible wall void, penetrates a floor or wall, or exposed on wall or at ceiling, the cable shall be in conduit.
         3) Where partial, detached or “floating” ceilings are provided or no finished ceiling is provided, the cable shall be in conduit, terminating in an accessible corridor ceiling void.
         4) The above conduits shall terminate in an accessible void and shall be bushed to prevent damage to cable. All conduits shall also be grounded to the BGES.
      d. Wiring splices are to be avoided to the extent possible, and if needed, they must be made only in accessible junction boxes and shall be crimp connected.
      e. Transposing or changing color coding of wires shall not be permitted.
      f. Wire nut-type connections are not acceptable. All connections shall be made on terminal strips (in boxes or cabinets).
      g. All conductors shall be labeled on each end with "E-Z markers" or equivalent.
      h. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal.

i. Cabinet terminals shall be numbered and coded. All controls, function switches, etc., shall be clearly labeled on all equipment panels.
j. All connections to components and equipment shall be made with crimp type terminal connections, or method approved by applicable systems manufacturer.
k. All wiring shall be checked and tested to ensure that there are no grounds, opens or shorts.
l. Ground all shields only at termination point (originating).
m. If shield is not to be grounded, pull shield back over cable jacket and insulate with heat shrink tubing to prevent accidental grounding.
n. Install cable connectors on all power limited cables entering enclosures except where cable is in protective conduit.
o. All cables installed in ceiling voids shall be attached to or supported from a vertical surface, a structural member or electrical conduit with a Caddy flexible cable support, bridle ring or cable clamp; or specified conductor tie (plenum rated where required). Absolutely **do not** support from ceiling system or fixture support wires **except** where accessing a ceiling mounted device. The cable(s) shall **not** block lay-in lighting fixtures, ceiling mounted HVAC equipment or ceiling tiles in order to allow **full** access to the ceiling void.

7. Terminal Strips: Where equipment does not have terminal strips, provide terminal strips to terminate and splice control, power limited and communication cables. Indicate wire numbers on strip with indelible pen.
8. Conductor Identification:
   a. Wire Markers:
      1) Identify all control wiring with a unique number for each wire.
   b. Splices:
      1) No splices shall be made in any conductor beyond the exterior walls of the Building except in exterior pullboxes, and where approved by the Engineer.
      2) Shielded power limited cable for Digital Control System wiring shall be splice free between sensors, DDC's and central processing unit.
9. Each applicable system shall have a separate conduit system unless the applicable system's manufacturer, Codes and Regulations permit other systems conductors to be installed in the same conduit.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Service Entrance Electrode Grounding System

B. Separately Derived System's Electrode Grounding System

C. Equipment Grounding Conductor (EGC)

1.03 RELATED WORK:

A. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

B. Section 26 05 23 – Control Voltage Electrical Power Cables

C. Section 26 05 33 – Raceway and Boxes for Electrical Systems

D. Section 26 05 36 – Cable Management for Electrical Systems

1.04 REFERENCES:

A. NFPA 70 (NEC), Article 250

1.05 DESCRIPTION:

A. The service entrance grounding electrode system shall be in accordance with NEC 250.64 and 250.66, and other applicable NEC Articles. The minimum grounding electrode system shall be a connection to the cold water main valve inside the building or structure plus the minimum of three (3) ground rods in a triangular pattern outside the building and the metal frame of the building or structure, where effectively grounded.

B. The separately derived system grounding electrode system shall be in accordance with NEC 250.30 and other applicable NEC Articles.

C. An insulated equipment grounding conductor, color coded per section 26 05 19, and the NEC, shall be provided for each alternating current circuit without exception.

1.06 TESTS:

A. The grounding electrode system shall have a resistance of 25 ohms or less as per N.E.C. 250.56. Resistance of the grounding electrode system shall be measured separately, with this system disconnected from the building, using the three-point "fall-of-potential" method. Measurements shall be made with appropriate ground resistance meters as manufactured by James G. Biddle; Associated Research, Inc.; or accepted equal.

B. The equipment grounding conductor shall be tested for continuity and proper bonding to metallic equipment enclosures, outlet boxes, wiring devices and similar items.

C. Equipment bonding shall be provided to all equipment on service side of conductors for all boxes, raceways and enclosures in accordance with N.E.C. 250.96 and respective N.E.C. 250.102 all sections.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Ground Rods: 3/4" X 10' copper-clad steel ground rods as manufactured by Copperweld, "Permaground" stainless steel clad ground rods as manufactured by Teledyne Metal Forming, or accepted equal. The copper shall have a minimum thickness of .013 inch at any point on the rod. If necessary to install ground rods deeper than 10'-0", then sectional ground rods shall be installed.

B. Ground Clamps: Thomas & Betts “GUV,” O. Z. Gedney “CG” series or Blackburn “GUV” series, as required by water pipe size and/or grounding electrode conductor size.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The service, which includes the service entrance conductors and raceways, and service equipment shall be grounded where required and in accordance with requirements of the National Electric Code.

B. Multiple-Rod Grounding Electrode System: The ground rods and ground grid system shall be of adequate design sufficient to allow for seasonal changes in soil characteristics and possible corrosion of the ground system by the soil, and shall be installed in virgin, undisturbed soil. Multiple-rod grids should be arranged in either a triangular arrangement or in a "hollow square" if of more than 3 rods, with spacing between adjacent rods not less than the average depth of the rods in the system. If the soil has been disturbed, either by the present construction or previous occupancies, then the ground rods shall be deep-driven, so that there shall be a minimum length of 10 feet in undisturbed soil.

   1. Where a portion(s) of the building is separated electrically from another portion of the building, the contractor shall electrically bond the two separate structures together with a #3/0 Bond wire. The bond wire shall be connected to the steel or UFER system on each structure with lugs and connectors. One bond connection shall cover at most 100 horizontal linear feet of structure.

C. Ground conductors shall be connected to the ground rod(s) by exothermic welding as manufactured by:

   1. "Cadweld" process by Erico Products, Inc., or
   2. The “ThermOweld” process by Continental Industries Inc.

D. Equipment Grounding Conductor (EGC):

   1. Provide a separate insulated grounding conductor, color-coded as per Section 26 05 19, enclosed in the same raceway with the phase conductors for all alternating current circuits, even though not necessarily shown on the drawings.
   2. The equipment grounding conductor shall be secured to the equipment enclosure at the source of power and at the apparatus being served by the alternating current supply.
   3. The minimum size for the grounding conductor shall be as specified in Table 250.122 of N.E.C.
   4. Existing alternating current circuits: If an equipment grounding conductor is not present in the existing feeder or branch circuit to be reworked, Division 26 shall provide new phase, neutral and grounding conductors from the related switchboard or panelboard to the indicated outlet.

END OF SECTION

SECTION 26 0533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Rigid Conduit (Heavy Wall, Intermediate Metal Conduit, Electrical Metallic Tubing and Rigid Non-Metallic Conduit)

B. Flexible Conduit (Liquidtight and "Greenfield")

C. Surface Raceway (SR) and Wireway

D. Fittings for Conduits, Flexible Metal Conduit, Surface Raceway (SR), Wireway.

E. Pull Boxes

F. Junction Boxes

G. Outlet Boxes

H. Exterior Pullboxes

I. Plugging Boxes

J. Floor Boxes

K. Multi-Service Recessed Floor Boxes

1.03 RELATED WORK:

A. Section 26 05 36 - Cable Management for Electrical Systems

B. Section 26 05 53 – Identification For Electrical Systems

C. Section 26 09 23 – Lighting Control Devices

D. Section 26 20 00 – Low-Voltage Electrical Distribution

E. Section 26 27 26 – Receptacles

F. Section 26 50 00 – Lighting

G. Division 27 – Communications

H. Division 28 – Electronic Safety and Security

1.04 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Rigid Heavy Wall Conduit (GRS): Essex, Allied Tubing, Republic, Steelduct, Triangle, L.T.V., Wheatland, or accepted equal.

B. Intermediate Metal Conduit (I.M.C.): L.T.V., Berger Industries, Inc., Allied Tubing, or accepted equal.

C. Electrical Metallic Tubing (E.M.T.): L.T.V., Wheatland, Republic, Steelduct, Berger Industries, Inc., or accepted equal.

D. Rigid Non-Metallic Conduit: Carlon "PLUS" Schedule 40, 90ºC, U.L. listed, Queen City Plastics, Sedco, Can-Tex Industries, or accepted equal.

E. Liquidtight Flexible Metal Conduit: Anaconda "Sealtite", O.Z./Gedney "Flex-Guard", Electri-Flex Co. "Liquid-Tight", or accepted equal.

F. Galvanized Single Strip Steel Flexible Conduit: American Flexible Conduit, Anaconda, Electri-Flex Co., or accepted equal.

G. Fittings (All fittings to be same materials as specified for conduit):
   1. Rigid Heavy Wall and Intermediate Metal Conduit Fittings: O.Z., T & B, Efcor, Berger Industries, or accepted equal.
   2. Electrical Metallic Tubing Fittings: T & B, Raco, Steel City, O.Z./Gedney, Berger Industries, Inc. or accepted equal.
   3. Flexible Metal Conduit Fittings: T & B, O.Z./Gedney, Midwest, Steel City, or accepted equal.
   4. Conduit "L's": Crouse Hinds, Killark, O.Z./Gedney, Shamrock Conduit Products, or accepted equal.
   5. Cable Supports: O.Z. type M, or accepted equal.
   6. **Underground Raceway Seals:** O.Z., Spring City Electrical MFG., or accepted equal [S].
   7. Fire Wall and Smoke Partition Seals:
      a. O.Z. type CFS fire seals or T & B "Flame Safe" Fire Stop System or 3M Brand Fire Barrier Penetration Sealing System #7904, 3M Brand Fire Barrier Caulk CP-25 and Putty 303, Nelson "Flameseal" fire stop putty, or accepted equal for each conduit or cable as required [S].
      b. Wiremold FlameStopper™ FS series Thru-Wall Fitting, STI EZ-Path, or other accepted equal for installation of power limited cabling through fire wall [S].
   8. Rigid Non-Metallic Conduit Fittings: Carlon, Queen City Plastics, Sedco, Can-Tex Industries, or accepted equal.
   9. Insulated Throat Metallic Bushings: O.Z./Gedney Type B or BLG, T & B nylon insulated metallic, or acceptable equal by Efcor. Provide grounding lug type where required.
   10. Service Heads: Appleton type F, or accepted equal by O.Z./Gedney, Steel City, or Crouse-Hinds.

H. Wireway: Square D or equal by Walker, or Hoffman.

I. **Surface Raceway:** Surface metal raceway and fittings shall be by the Wiremold Co. or acceptable equal by Walker and Mono-Systems [S].

J. Pull and Junction Boxes: General Metals, Electromate Mfg. Corp., Hoffman, or accepted equal.

K. Outlet Boxes: Appleton, Raco, Steel City, or accepted equal.

L. Outlet Box Brackets: E-Z Mount Bracket Co., Inc., Montvale, Virginia 24122 (540-947-5500), or accepted equal by Caddy, Raco.

M. **Floor Boxes:** Hubbell, Steel City, T & B, C.W. Cole, or Walker [S].

N. **Plugging Boxes:** C.W. Cole & Co., Inc. or accepted equal [S].

O. **Multi-Service Floor Boxes:** Walker, Inc., or accepted equal [S].

P. **Exterior Pullboxes:** Quazite Corporation, Blackburn-Weaver, Bell, Perfect-Line, O.Z./Gedney, Carlon, or accepted equal [S].

2.02 MATERIALS AND USE:

A. Rigid Heavy Wall Conduits (GRS): Of mild steel tube, electro or hot-dipped galvanized and U.L. labeled.

B. Intermediate Metal Conduit (I.M.C.): Of mild steel tube in sizes 3/4" to 4", hot-dipped galvanized or electro-galvanized and U.L. labeled. Refer to limitations under Part 3 - EXECUTION.

C. Electrical Metallic Tubing (EMT): Of mild steel tube in sizes 3/4" to 4" hot-dipped galvanized or electro-galvanized and U.L. labeled. Refer to exceptions under Part-3.

D. Flexible Metal Conduit:
   1. Liquidtight flexible metal conduit: Flexible galvanized steel tubing covered with extruded liquid-tight jacket of PVC and a continuous copper bonding conductor wound spirally between the convolutions. Refer to limitations in Part 3 - EXECUTION.
   2. Galvanized single strip steel flexible conduit (Commercial Greenfield): UL 1 listed. Refer to limitations in Part 3 - EXECUTION.

E. Rigid Non-Metallic Conduit: Schedule 40 PVC (polyvinyl chloride) conduit that meets and exceeds UL 651, NEMA TC2-1978 for above ground, direct burial, concrete and exposed applications. Refer to limitations in Part 3 - EXECUTION.

F. Fittings:
   1. For Rigid and Intermediate Conduit: Couplings to be galvanized or sherardized steel. Double galvanized steel locknuts shall be used where required by code. Single locknut and bushing may be used elsewhere. Insulated throat metallic bushings to be installed on all rigid conduit terminations where such bushings are required by NEC to protect the wires from abrasion. Use ground lug type where required.
   2. For E.M.T.: Steel set screw connectors, permanently indented or gland compression type. **Do not use cast metal type.**
   3. For Flexible Metal Conduit: Standard liquidtight fittings for liquidtight conduit. Standard steel flexible metal conduit fittings for standard flexible metal conduit.
   4. Conduit "L's": Galvanized steel, threaded, "LB" or "LBD".
   5. Cable Supports: To be installed for the support of all conductors and cables as per NEC Article 300-19.
   6. Underground Raceway Seals: Provided on each underground electrical raceway entering building. Provide type "FSK" "thruwall" seals on each conduit passing through the outside wall or floor. Provide type CSBG conduit sealing bushing on each underground conduit at the first pullbox, panel or other location as noted on drawings.
   7. Fire Resistance Rated Wall and Smoke Partition Seals:
      a. Provide fire-seals for each conduit or cable passing through fire rated walls and floors where the floor, wall or smoke partition has a rating up to three (3) hours in accordance with Manufacturer's application data. All penetration systems shall have been tested per ASTM B14-88 fire test and UL listed for "Through-Penetration Fire Stop System".
      b. Provide UL approved thru-wall fittings for passage of power-limited cabling where cable tray, path of cable hooks, or other major cable pulling route intersects fire wall. The system shall expand rapidly where exposed to fire or high temperature to provide the required firestopping. The fittings shall be complete with built-in firestopping material and through-wall penetration. Each penetration shall be equivalent size of a 4” conduit sleeve or greater and shall remain fully accessible to add or remove cables without disturbing the firestopping material. The fittings shall have been UL-tested and meet the requirements of ASTM E814 UL1479 and shall be rated for 4 hours. Fittings shall be UL approved for use in air plenums.
   8. For Rigid Non-Metallic Conduit: PVC fittings, elbows and cement shall be provided by the same manufacturer who provides the rigid non-metallic conduit.
   9. Conduit Expansion Joints: O.Z. mechanical type, or accepted equal, on each conduit run crossing building expansion joint.
   10. Service Heads: As required by conduit size.

G. Surface Raceway:
   1. The raceway shall consist of a base and cover section factory assembled and designed to accommodate pulling conductors through the raceway. Raceway shall be U.L. labeled.

2. The base section shall have a nominal material thickness of .040" and be manufactured of zinc plated or galvanized steel. 6000 base shall be .060" thickness.
3. The cover section shall have a nominal material thickness, as listed below, and be painted with a baked enamel finish which is capable of being over-painted in the field if required.

Mark	Series	Cover Thickness
SR2	Wiremold 200	.025”
SR5, SR7	Wiremold 500, 700	.040”
SR22	Plugmold	.040”
SR3	Wiremold 3000	.040
SR4	Wiremold 4000 (w/divider)	.040"
SR6	Wiremold 6000 (w/divider)	.040"

4. Raceway dimensions shall be as follows:

Mark	Series	Dimensions
SR2	Wiremold 200	½” W x 11/32” H
SR5	Wiremold 500	¾” W x 17/32” H
SR7	Wiremold 700	¾” W x 21/32” H
SR22	Plugmold 2200	2-3/8” W x 3/4” H
SR3	Wiremold 3000	2-3/4” W x 1-17/32” H
SR4	Wiremold 4000 (w/divider)	4-3/4" W x 1-3/4" H
SR6	Wiremold 6000 (w/divider)	4-3/4" W x 3-9/16" H

5. Fittings:
   a. General: A full complement of fittings must be available including, but not limited to, bushings to prevent wire abrasion, single and multiple gang boxes to accommodate device installation, adapters from conduit to raceway, transitions to both larger and smaller surface metal raceways, receptacle covers, wiring device brackets, take-off connectors, pre-wired receptacle harnesses, 90 degrees elbows, tees, fixture boxes and flexible sections to allow uninterrupted continuation of raceway along semi-circular or curved surfaces.
   b. SR4 (4000) Wiring Device Plates: Each receptacle location shall have a Wiremold #4048B device cover plate and specified duplex receptacle. Each Data/Comm. Location shall have a Wiremold #V4007C-1 Device cover plate and a blank faceplate per section 26 27 26 selection with color to match raceway.
6. Refer to limitations under PART 3 - EXECUTION.

H. Wireway:
1. Wireways shall be listed to meet UL 870.
2. Wireway covers and troughs shall be constructed from a minimum of 14 gauge steel before finishes are applied. The end flanges shall be constructed from ten gauge steel. All lengths and fittings shall have smooth, rounded edges to prevent damage to wire and cable insulation. Wireway shall be furnished without knockouts.
3. Wireway covers shall have oil-resistant closed cell gasketing for sealing purposes. A solid oil-resistant neoprene joint gasket shall be used between flanges for rigidity when sections and fittings are bolted together.
4. A gasketed captive hinged connector which interlocks with the covers shall be used at each joint. The connector shall be such that the covers cannot be closed and latched without closing the sealing connector.
5. Wireway shall be provided with quick-release cover latches which hold the cover securely in place when closed. Latches shall have provision for a sealing wire to be used when covers and latch are in the closed position.
6. Wireway covers shall be secured to the troughs with leaf type hinges which all allow full opening access to the wireway interior.
7. Provide NEMA-1, NEMA-3R, NEMA-4X, NEMA-12 or other NEMA enclosure where required by NEC or environmental conditions.

I. All boxes to be sherardized or galvanized (after fabrication) sheet steel (except floor boxes) code gauge boxes.

J. The minimum size of all boxes shall conform to the requirements of the National Electrical Code, unless noted to be larger on the drawings, and shall have adequate braces and supports.

K. Pull and Junction Boxes: All boxes shall have screw-on or hinged covers. All flush mounted boxes shall have 3/4" overlapping covers with flush-head cover retaining screws and covers in finished areas shall be prime coated with paint.

L. Outlet Boxes:

1. All boxes shall have ears turned in. Multiple gang boxes must be one piece type (not built-up). Provide 3/8" (or larger if required) fixture stud in all fixture boxes. Provide appropriate covers as required, including 3/4" deep plaster ring covers where plaster may be encountered. Provide vapor proof outlet boxes for vapor proof fixtures. Provide size and type of boxes as required by location and N.E.C., except where exposed masonry occurs, use one piece "tile boxes". All boxes shall be 4" square boxes with "tile rings" unless noted otherwise or where larger sizes are required. All outlet boxes requiring hangers shall be hung with metal hangers.
2. **All exposed boxes below ceiling level shall be cast type FS or FD.**

M. Stud Wall Outlet Box Brackets: Provide #E-Z 1-4, #E-Z 4-1116 or #E-Z 23-1 outlet box brackets with extension brackets or acceptable equal.

N. Outlet Box Bar Hangers: Provide adjustable or solid bar metal hangers by Appleton Electric Manufacturing or accepted equal.

O. Floor Boxes: Unless noted otherwise, provide Hubbell #B-2537-SA3725, or accepted equal, (or terrazzo type where needed) cast iron watertight floor box, aluminum cover and flange, with devices as specified under Wiring Devices. Each box shall have two Hubbell #S-3061 protective rings. For floors thicker than 3" provide Hubbell Series B-2536-SA-3725, or accepted equal. Telephone boxes, Hubbell #B-2537-SA-2525 with Hubbell #SA-3061 fitting. Other floor boxes are as specified elsewhere or called for on the drawings. Provide carpet flanges where carpet is encountered.

P. Recessed Floor Boxes: Unless otherwise indicated, provide "shallow" adjustable cast iron water-tight recessed floor boxes complete with aluminum cover and flange, carpet flange (if required), brass protective rings for cord connectors, low-profile bushed aluminum service heads (above floor) for telephone/data cable, and terrazzo type construction where required. All over height shall be 2-13/16" with a minimum of 30 cubic inch capacity.

Q. Through floor wiring for power and communications shall be Walker RC4 Series Multiple Service fire-rated poke-through fittings, UL classified, meeting NEC Article 300-21. Fire-rating of fitting shall match the fire-rating of the floor. Fitting shall be self-supporting without the attachment of an above-floor fitting, and consist of two (2) factory pre-wired NEMA 5-20R duplex receptacles to the integral junction box and two (2) blank plates for future installation of any of the following: Category 6, Category UTP, fiber optic, coax, audio and video connections. Each poke-thru fitting shall have two (2) runs of ½" conduit extending from its base to the location indicated on the drawings. Above floor fittings shall be flush, and provided with carpet flange in color to match Owner's carpet where applicable. Box assembly shall meet UL 514 scrub water exclusion requirements in areas where hard floors are encountered, and in areas where scrub water is anticipated.

R. Exterior Pullboxes: Provide reinforced polymer concrete service box, extension, and cover with proper logo with a minimum of 7.4 cubic feet of interior space unless otherwise indicated and meets ASTM D-756, D-543, D-570, D-790 and D-365 test requirements.

S. Plugging Boxes: C.W. Cole & Co., Inc. recessed stage floor pockets and wall boxes, with outlets as indicated on the drawings. Housing to be 16 gauge steel. Floor boxes to have cast-iron cover, nonskid tread design, self-closing door, cord clearance slots, baked black enamel finish, and suitable for mounting in wood or concrete floors. Wall boxes to have cast aluminum cover with self-closing door, lock plus two keys (all units keyed alike), baked aluminum enamel over corro-sion-resistant primer, suitable for mounting in stud wall.

T. Multi-Service Recessed Floor Boxes (FB): Walker Inc., #RFB4-CI-1, cast iron recessed four (4) compartment combination box complete with combination wire tunnel/mounting bracket, two (2)

internal duplex receptacle brackets as required, internal blank brackets as required, telephone/data brackets as required (Contractor to match telephone and data jacks' specification), flush access hatch with floorport flanged activation kit consisting of die-cast aluminum trim ring in finish color selected by Architect and insert areas for carpet or tile cutouts to match surrounding finish, or doors with 1" conduit openings for furniture feeds, as required. Box assembly shall meet UL 514 scrub water exclusion requirements in areas where hard floors are encountered, and in areas where scrub water is anticipated.

U. Wood Floor Boxes: Unless otherwise noted, provide Walker #880 Series steel floor box (one, two, or three gang with removable barriers for multi-service applications as required) with flush mount brass combination flange and multiple #828 brass duplex cover plates having flip lids and locking screws (3828GFITC plate for GFI receptacle applications and low voltage connectivity requirements). Provide all inserts, modules and jack to match Owner's requirements and as indicated on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Provide raceway systems to achieve required distribution, switching and circuit control. All wires for all systems shall be installed in rigid metal raceways and terminated in boxes or cabinets, unless otherwise specified herein as partial conduit or non-conduit installation. Allow for making connections to all outlets, motors, etc., indicated and check plans to insure that all outlets, etc., have a designated circuit. Notify the Engineer of any discrepancies found.

B. Conduit runs are not shown on the drawings, unless specifically noted or indicated otherwise.

C. Conceal all (new) raceways (in existing and new construction) except where specifically noted on drawings or permitted as exposed. Runs in mechanical room areas may be exposed. Exposed conduit must be run parallel with the building walls and supported in a neat substantial manner. Refer to surface raceways under PART 3 - EXECUTION.

D. **Cap** raceway systems during course of construction and thoroughly clean inside before installation of conductors.

E. Provide a completely separate raceway system for all emergency lighting and exit sign circuits as required by N.E.C.

F. No rigid raceway for line voltage wiring shall be smaller than 3/4", except for flexible conduit, unless specifically indicated otherwise. The Electrical Trade shall size all other raceways based on the N.E.C. and verify the sizes shown on the drawings, increasing same if required by local authorities and/or codes.

G. All conduit feeding from one building area to another shall remain within the confines of the building, unless shown or noted otherwise on the drawings.

H. Field made conduit bends shall be made with an acceptable bending machine or conduit bender.

I. Flexible Metal Conduit:
   1. Liquidtight flexible metal conduit cannot be used in any return air plenum. Standard galvanized single strip steel flexible conduit shall be used in all return air plenum spaces.
   2. Liquidtight flexible metal conduit for **all** flexible connections, **plus** all short (less than 6' long) motor connections, transformers and all equipment subject to movement or vibration and where permitted by the Engineer. For flexible connections in return air plenums, flexible metal conduit shall be substituted for liquidtight flexible metal conduit.
   3. Galvanized single strip steel flexible conduit (6' maximum length) limited to use as the flexible connection to recessed lighting fixture assemblies *(only)* (and in existing wall voids).

J. Rigid Metal Heavywall Conduit (GRS):
   1. All joints shall be properly threaded and made tight in standard conduit couplings.
   2. All thread conduits or nipples are not acceptable.

3. All conduit cuts shall be square, made with a hacksaw or approved cutting machine, and reamed after threading and before installation to remove burrs.
4. All threads, both field-cut and factory-cut, not otherwise protected, shall be painted after installation with two coats of asphaltum paint if concealed and two coats of primer base paint if installed in an exposed location.
5. GRS shall be used in service entrance raceways where exposed.
6. Clamps to be malleable two (2) hole galvanized iron and hangers to be rod type steel.

K. Where conduits are exposed to occupants, up to 8'-0" feet above the floor, the conduits shall be snug to the wall and secured with two (2) hole clamps (utilizing specified detention type fasteners).

L. Intermediate Metal Conduit (IMC):
1. Applicable specifications for installation of rigid metal conduit applies to IMC.
2. IMC can be substituted for GRS per the NEC.

M. Electrical Metallic Tubing (EMT):
1. Applicable specifications for installation of rigid metal conduit applies to E.M.T.
2. E.M.T. shall **not** be used underground, cast in concrete, exposed on exterior of buildings, and exposed interior locations below 8'-0" (above finished floor).
3. E.M.T. may be routed down exposed interior walls to top of panelboards, motor starters, disconnect switches, light switches, etc.
4. E.M.T. is permitted in electrical and mechanical equipment rooms, per detail on drawings.

N. Rigid Non-Metallic Conduit (PVC):
1. All elbows and nipples to be same material as specified for conduit.
2. All joints to be solvent welded in accordance with conduit manufacturer's instructions.
3. Hanger clamps to be PVC coated malleable iron and hangers to be PVC coated rod type steel.
4. Conduit clamps to be PVC coated, two hole clamps complete with nylon hardware.
5. PVC conduit shall be limited to the following applications:
   a. Underground secondary service entrance concrete encased conduits outside the perimeter of the building and routed under the concrete floor slab on grade to the service entrance equipment.
   b. Underground branch circuit and feeders (under 600 volts), telephone, fire alarm, sound system, control conduits in specified concrete encasement outside the perimeter of the building and in or under the concrete floor slab on grade. The PVC conduit can be routed from the concrete floor slab on grade directly into the masonry unit wall cavities, metal wall stud cavities up to the first wall box only, maximum 4’ aff. PVC shall not be exposed within the building except if within a floor mounted enclosure or panelboard to floor conduit enclosure. The PVC conduits under a concrete floor slab on grade will not require concrete encasement if the slab is more than 2-1/2" thick. Exposed PVC conduit stubs above the concrete slab shall not be permitted. Only exposed rigid metal conduit stubs are permitted.
   c. Underground branch circuit and feeders (under 600 volts) for outdoor lighting only.
   d. Provide specified concrete encasement per Section 16115.
6. PVC shall not be acceptable in areas where subject to ambient temperatures exceeding those for which PVC conduit is approved, for the support of fixtures or other equipment and other areas not permitted by Codes.

O. Supports: Provide metallic supports as required for the proper installation of the raceway or conduit systems and all other equipment installed under this contract. **Wire shall not be used to support or tie down any conduit system.**

P. Empty Conduits: Pull #12 stranded gauge galvanized fishing wires or stranded nylon line through all empty conduits for all systems. These wires or lines to remain in the conduits.

Q. Exposed Masonry: Where wall finish is exposed masonry, raceways shall be so placed in wall that the masonry unit can be neatly set around it with minimum cutting and without injury to the exposed masonry face.

R. Wireways:

1. Furnish and install a complete lay-in wireway system where required. Wiring capacity shall be determined by NEC unless larger dimensions are indicated.
2. Wireway lengths and fittings shall be securely bolted together with same size slotted paint cutting hex-headed shoulder bolts and hex nuts with captive external tooth lock washers which maintain electrical ground continuity across the joint. Each joint shall be gasketed between end flanges. The sealing cover connector shall be installed so as to be held captive and maintain the lay-in ability of the wireway.
3. Wireway shall be installed in accordance with the National Electrical Code requirements.
4. Wireways shall be supported at intervals not exceeding five feet unless specially approved for supports at greater intervals. The ten-foot straight sections of wireway shall be Underwriters Laboratories, Inc. listed for support at ten-foot intervals.

S. Surface Raceway:
1. Install surface raceway in accordance with manufacturer's recommendations and instructions. Raceway capacity shall be determined by NEC unless larger capacity is indicated.
2. Refer to drawings and elevations for routing of all surface raceways and multi-outlet systems.
3. Surface raceway systems shall be limited to the applications and locations indicated on drawings.
   a. Existing solid masonry or concrete walls without furred out drywall, plaster lathe, paneling or other wall covering or if the furred out space is less than the dimension of a conduit or metal clad cable, surface raceway shall be permitted.
   b. Existing hollow core masonry walls where indicated. All other hollow core masonry walls shall have recessed outlets unless cores are blocked with mortar or structural member.
   c. Unless otherwise indicated, route all surface one-piece raceways vertically to floor or ceiling with no horizontal runs except under whiteboards, tackboards, windows, or casework. Short horizontal runs shall be permitted with two (2) surface raceway outlets less than 48" apart.
4. Multi-system divided raceways, SR4 and SR6, are intended for power on one side and power limited cabling in the remaining side. Fire alarm system wiring shall be type MC cable if installed in the multi-systems raceways per NEC. Provide divided (or multiple) junction boxes at the termination of multi-system raceways to allow the "homerun" conduits to be routed to the various power sources and power limited cabled systems. Separation of the various wiring systems shall be governed by the NFPA codes. Provide snap-in wire retainers to keep wiring in raceway during installation before cover is installed, and to facilitate future work.

T. All underground conduits including in grade and under floor slabs shall be watertight over the entire length, to prevent entry of water at connections. Provide compatible sealants for material encountered.

U. All conduits installed under the concrete slab shall be completely underneath the concrete slab. Care shall be taken to ensure that no part of the conduit is within the concrete slab.

V. Pull and Junction Boxes: Provide all necessary pull and junction boxes where indicated or required by National Electrical Code. Certain pull and junction boxes may be shown on the drawings for specific design reasons but is not to preclude the fact that additional boxes will be required to conform to codes and good practice.

W. Outlet Boxes:
1. General: All outlet boxes shall be set flush or set to meet the N.E.C. requirements; otherwise box extensions shall be installed. Mounting heights of all outlets shall be as indicated on the drawings, specified herein, or as permitted on the job. Support all boxes to maintain alignment and rigidity. Clean boxes of all foreign matter prior to installation of wiring and/or devices. Adjacent outlet boxes shall be aligned horizontally at the same height, or vertically in the same line, as required.
2. Wall Outlets:
   a. Where the outlet boxes are shown back-to-back in the walls of 6" or less in thickness, the boxes shall be offset horizontally. Through-the-wall outlet boxes shall not be permitted.

Outlet boxes, indicated to be installed side-by-side in the same wall, shall be located 6" apart. All boxes shall be rigidly secured in the wall.

b. Steel Outlet boxes in fire walls and fire separation assemblies shall be installed in accordance with International Building Code 704 and 714 respectively. Therefore outlet box openings cannot exceed 16 square inches per outlet with 100 square inches limit per 100 square feet of wall area. Where outlet boxes are shown in opposite sides of the wall or assembly, the boxes shall be separated by a horizontal distance of not less than 24 inches.

3. Exposed Masonry: The outlet boxes shall be placed in the wall to allow the masonry unit to be neatly set around the box, with the minimum of cutting and without injury to the exposed masonry face. The dimensioned heights of the outlets in the exposed masonry walls are intended to mean to the nearest masonry joint.
4. Stud Walls: The outlet boxes shall utilize the wall brackets and extensions as required. The Electrical Trade shall coordinate with the dry wall or plaster lathe installation trade for fastening the outboard part of bracket to prevent any movement of the outlet box within the wall cavity.
5. Floor Outlets: Outlets that are indicated to be installed side by side in the floor shall be located 3" apart.
6. Ceiling Outlets: All flush mounted ceiling outlet boxes shall be supported by adjustable or solid bar metal hangers or directly supported by threaded steel rods or stud type fasteners.
7. Local Switch Outlets: Prior to the installation of the local switch outlet boxes, the Contractor shall verify the door swings to insure the proper location of the box. This outlet shall be installed with a minimum of 4" of separation from door jamb trim. Refer to typical elevation for mounting outlet boxes at doors.

X. Conduit Termination: All rigid heavy wall metal conduits (G.R.S, I.M.C. and E.M.T.) and rigid non-metallic conduits (P.V.C.) shall terminate with locknut and bushing in all boxes, cabinets, panels, etc. Where a grounding means is not provided in the box, cabinet, panel, etc. provide a locknut and grounding bushing.

Y. Exterior Pullboxes: Install flush with finished grade on a minimum of tamped 6" gravel base.

Z. Plugging Boxes: Install flush with finished floor or wall. Refer to drawings for proper support and installation method.

AA. Multi-Service Recessed Floor Boxes: Install flush with finished covering or floor. Provide receptacles, telephone/data jacks and other outlet configurations as indicated. Install telephone, data and other systems jacks as specified hereinafter. Where the box penetrates to floor depth, coordinate with related trades for additional support.

BB. Wood Floor Boxes: Install flush with finished floor. Where box is to be installed in raised wood floor (i.e., stage applications, etc.), provide additional support underneath box to adequately withstand potential loads as determined by the use of the space. Provide receptacles, telephone/data jack and other outlets as indicated. Install telephone, data and other systems jacks as specified hereinafter.

END OF SECTION

SECTION 26 0536
CABLE MANAGEMENT FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Wall Brackets

B. Cable Tray

1.03 SUBMITTALS:

A. Submit shop drawings and product data on all equipment specified in this section in accordance with Section 26 05 00. Provide installation shop drawings in accordance with 3.01.B.3 below.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Open Wire Management Hardware:

1. Brackets, Wall Metallic “C” shaped hanger by Mono-Systems, Inc. (The Hook).
2. Cable Trays: Mono-Systems, Inc., Mono-Tray/50 lb./ft. Series Tray or equals by Atlas Cable Tray and B-Line or other acceptable equal meeting all requirements specified herein.

2.02 MATERIALS AND USE:

A. Wall Brackets / Center Supported: Brackets shall be multi-use "C" or “J” shaped hanger with 9/32 (7mm) diameter holes on four (4) sides. The center space shall provide the required cross section area for the cable being supported. The bracket shall be 6063-T6 aluminum, steel or galvanized metal with box beam design (19mm x 12mm x 2mm thick walls), one (1) inch radii turns, smooth and free from sharp edges, two (2) 7mm holes in long side, one (1) 7mm hole in both short sides, and mounted with 6mm (1/4") hardware or supported with rod and clamps from structure. This is the basis of design. Other manufacturers are acceptable. Product shall have a same form, fit and function and be suitable for support data cabling.

B. Cable Tray:

1. General: Cable trays shall be of ventilated construction with widths and depths as indicated. The cable tray shall be center supported or wall mounted as required. The cable tray shall be constructed of 6063-T6 aluminum alloy and shall utilize a center spine being 1.5 in. wide x 2.75 in. high and square/triangular cross section rungs a minimum of .50 inches thick. Rungs shall be staked in place, not screwed or welded. All fittings and accessories are also 6063-T6 aluminum.
2. Ceiling Center Supported Cable Tray (CT1) shall be constructed of a center rectangular aluminum tube which forms a spine to which square/triangular cross rungs are attached on 6 inch centers. The cross rungs shall be bent up at their ends to a height of 3.5 inches to form a center supported, open sided, ladder like assembly. The tray shall not have side rails. Rungs shall emanate at right angles from the top of the spine. Tray width shall be 12".
3. Wall Mounted Cable Tray - Single Tier (CT2) shall be constructed of a rectangular tube which forms a spine to which cross rungs are attached on 6 inch centers. These cross rungs shall be attached to emanate from one side of the spine and shall be bent up at their ends to a height of 3.5 inches to form an open sided ladder like assembly. The tray shall not have side rails. Rungs shall emanate at right angles from the top of the spine/bottom of the spine. Tray shall

be mounted by fastening the spine directly to the wall in accordance with the manufacturer's specifications. Tray width shall be 9".

4. Wall Mounted Cable Tray - Double Tier (CT3) shall be the same specifications as wall mounted single tier cable tray above except it shall have two sets of vertically stacked cross rungs.
5. Ceiling Supported Ladder Tray (LT) shall consist of two longitudinal “I” shaped members (side rails) with transverse members (rungs) welded to the side rails. The ladder tray shall be constructed of extruded 6063-T6 aluminum alloy and shall have rounded edges and smooth surfaces. Rungs shall be spaced 6” inches on center. Rung spacing in radiused fittings shall be approximately 9” at center of fitting. No portion of the rungs shall protrude below the bottom plane of the side rails. Ladder tray depth shall be 3 inches per NEMA VE-1. Tray width shall be 12".
6. Fittings:
    a. Splice Connectors: Sections of tray and all other fittings shall be joined by using a two bolt, 4" long rectangular splice connector which telescopes into the spine of the tray. Splice connectors shall allow for thermal expansion/contraction of the tray system. The splice connectors shall be provided with a vertical hole to accept 1/2 inch threaded rod which is used to support the tray in an overhead application.
    b. Right Angle Couplings: Horizontal and vertical, quick connect items shall be used for all 90 degree elbows, tees and crosses by clamping to the spine without the need for drilling or cutting.
    c. Angle Connectors: Horizontal and vertical shall be used for angles of 90 degrees to 30 degrees and fasten into the spine in the same manner as the above splice connectors.
    d. Dropouts, Conduit Bushing Dropouts, End Caps, as well as all other accessories shall effect a complete rigid mechanical tray installation of compatible material and design.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Wall Brackets: The metallic "C" shaped wall (or ceiling) brackets shall be wall mounted or suspended on a minimum of 24" centers for the support of Data, telephone, fire alarm, CCTV, telephone communication and direct digital controls system (Division 23) wiring and cabling. Wall brackets shall be installed in continuous and even rows, above each corridor ceiling, spaced as indicated above. Coordinate installation of wall brackets with piping, ductwork, conduits, etc. All wall brackets shall be readily accessible for installation of low voltage wiring systems. Wall brackets are required in all corridors where cable tray is not installed and in additional locations as indicated on the drawings.

B. Cable Trays (CT):
    1. Wall Mounted Cable Tray - Single and Double Tier shall be installed as follows (based on Mono-Systems):
        a. Wall rack cable tray shall be supported with 3/8" diameter anchors.
        b. Three anchors should be fastened approximately as indicated in detail on drawings.
        c. Maximum load capacity of tray is 50 lbs/ft.
        d. When supporting tray on a concrete wall, expansion anchors shall be used to give a safety factor of 4.
        e. When supporting wall rack tray on a sheet rock hollow wall a 3/8" diameter threaded rod should be mounted thru the wall with a sufficiently large fish-plate mounted on the far side. The fish-plate should be of sufficient area and thickness so that the pressure on the far wall exerted by the load in the tray is light enough so that it does not crush the wall.
        f. When tray is mounted on a steel wall or columns, powder actuated heavy duty fasteners (drive pins) may be used provided pull or shear loads will give a safety factor of 4.
        g. Splice connectors with or without vertical holes may be used when hanging wall rack.
        h. Provide additional extra hangers whenever in doubt or for any unusual situation.

i. Wall rack shall be installed with 3 spacers per 12 ft. section. Spacers provided with tray. Anchor bolts shall go through spacers. Refer to detail on drawing.
j. Cable tray shall be installed with complete access to allow cable to be laid directly into the tray without pulling.
k. Lay heavy cables as far into the tray as possible.
l. During and after installation of cable tray, care shall be taken by all the tradesmen not to hang from the tray rungs or walk on the tray.
m. All nuts, bolts and washers are supplied with all fittings.
n. When pulling cable into tray, sufficient rollers and sheaves shall be used so that tray is not damaged.

2. Ceiling Center Supported Cable Tray and Ladder Tray shall be installed as follows (based on Mono-Systems):
   a. Cable tray shall be supported with 1/2" diameter thread rod. For ladder tray, provide two (2) rods on each side every six (6') feet.
   b. Maximum span is 12 feet.
   c. Maximum load capacity is 50 lbs/ft on a 12'-0" span.
   d. At support points, threaded rod shall be hung from concrete inserts, clamps or devices that are securely fastened into the slab, wall or beam sufficiently to carry the load of the tray and its contents with a safety factor of 3.
   e. Eccentric loading on each side of tray should not exceed 1 60% vs 40% load differential.
   f. Install stiffener bars, Mono-Systems #0100-0569, along the length of the tray run when length of threaded hanger rod (underside of slab to tray) exceeds 3 feet (refer to drawings). Stiffener bars are manufactured with a preload angle and should be mounted opposite the side of the tray having the heavier load.
   g. Provide additional hangers whenever in doubt or for any unusual situation.
   h. When connecting 12 foot sections at other than hanging points, use splice connectors with no vertical holes. When hanger rod is mounted at other than splice connector points along tray, drill a 5/8" hole vertically through the spine and insert hanger rod with nuts and washers. Do not drill holes in spine unless a hanger rod is used.
   i. Cable tray shall be installed with complete access from either side to allow cable to be laid directly into the tray in lieu of pulling.
   j. Lay heavy cables in center of tray.
   k. During and after installation of cable tray, care shall be taken by all the tradesmen not to hang from the tray rungs or wall on the tray.
   l. All nuts, bolts and washers shall be supplied with all fittings.
   m. When pulling cable into tray, sufficient rollers and sheaves shall be used so that tray is not damaged.
   n. Notched splice connectors which are supplied with bottom rung tray should be used to splice field cut joints only. Use standard splice connectors to tie 12 foot sections together.
3. Cable and Ladder Trays: All cable trays shall be installed with manufacturer’s drawings and written instructions for the type of construction encountered. The methods specified hereinbefore are typical for Mono-Systems Cable Tray and are intended for general installation methods. Contractor shall have cable tray manufacturer prepare installation shop drawings for the Architect/Engineers specified review process. Although the drawings indicate various sections of ceiling and wall mounted cable tray, the Contractor may use either version to suit the job site conditions for coordination with the mechanical and structural systems.
4. Division 27 & 28 systems including Fire Detection and Alarm System, Intrusion Detection System, Access Control System, Telephone (Owner's) System, Communication/Data Network, Building InterCommunication System and CATV System conduits that enter the cable tray, shall have grounding type bushings with a #10 green insulated or bare ground wire bonding the conduit to the tray spine with self-tapping 10-32 cadmium pan-head screw of sufficient length or cable tray conduit bushing "dropout". The drilling and bonding method shall be acceptable to the tray manufacturer. All cable trays shall be continuously bonded together and grounded to the building grounding electrode system (BGES) at each communication closet/room.

5. **No** conduit or unlisted (E1A-T1A) wiring system shall be permitted to utilize the cable tray system in any form. No conduit shall parallel the tray system within 2" or pass over or above the cable tray system within 2" per EIA/TIA standards. No unshielded wire system can parallel the tray system within 5" or pass over or above the cable tray system within 5" per EIA/TIA standards.

END OF SECTION

SECTION 26 0543

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Underground Power, Telephone, Fire Alarm, CATV and Communication Raceways (Ducts)

B. Prefabricated Manhole(s)

1.03 RELATED WORK:

A. Section 26 05 00 - Common Work Results for Electrical

B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables

C. Section 26 05 23 - Control Voltage Electrical Power Cables

D. Section 26 05 26 - Grounding and Bonding for Electrical Systems

E. Section 26 05 53 - Raceway and Boxes for Electrical Systems

F. Division 27 - Communications

G. Division 28 - Electronic Safety and Security

1.04 REQUIREMENTS:

A. Standards:
   1. National Electric Safety Code (NESC)
   2. Applicable AASHTO specification and testing for precast manholes.
   3. National Electrical Manufacturers Association (NEMA)
   4. American National Standards Institute (ANSI)
   5. Local Electric Utility Company Regulations
   6. NFPA-70

1.05 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 26 05 00.
   1. Shop drawings for the pre-cast concrete manholes shall include:
      a. Dimension layout and weight
      b. Material and Structural Specifications
      c. Manufacturing Procedures
      d. Quality Control
      e. Manhole lid and frame
   2. Product Data: Submit application, technical and installation data.

PART 2 - PRODUCTS [S]

2.01 MANUFACTURERS:

A. Pre-cast Concrete Manhole: Smith Midland Company, (Midland, VA/540 439-3266) or local area pre-cast concrete manufacturer.

B. Manhole Lid and Frame: Construction Casting Co., Atlanta, Georgia; Neenah Foundry Company, Neenah, WI; Dewey Bros., Inc., Goldsboro, NC.

C. Underground Marker Tapes: Seton Metallic Detection Tapes, Panduit Underground Hazard Tape, Thomas & Betts, Ideal.

2.02 MATERIALS:

A. Precast concrete manholes (unless otherwise indicated):
   1. Type A: Smith Midland Company model #880MH two (2) section utility vault complete with one or more 12" ring riser(s) (#4112), pulling irons, pulling eyes (and inserts), bolting inserts (for cable racks, etc.), center mount utility vault ladder, required insulated cable racks and hardware for complete installation.
   2. Type B: Smith Midland Company model #660MH two (2) section utility vault complete with one or more 12" ring riser (#4112), pulling irons, pulling eyes (and inserts) bolting inserts (for cable racks, etc.), center mount utility vault ladder, required insulated cable racks and hardware for complete installation.
   3. Type C: Smith Midland Company model #444 junction box complete with standard concrete lid, one or more 12" riser rings (#412), pulling eyes (and inserts) and hardware for complete installation.

B. Manhole Lid and Frame: Construction Casting Co. #B-1640 series complete with logo "ELECTRIC" or "TELEPHONE". Dewey Bros., Inc. "MH-RCR" series and Neenah #R-1640 series with similar logo are acceptable equals.

C. Underground Marker Tapes (unless otherwise indicated):
   1. Electric: Seton #37223 6" x 1000' metallic underground detection tape or similar by Panduit "HTU" series or Thomas & Betts #0700 series with proper logo and red background.
   2. Telephone and CATV: Seton #45385 6" x 1000' metallic underground detection tape or similar by Panduit "HTU" series or Thomas & Betts #0700 series with proper logo and orange background.

PART 3 - EXECUTION

3.01 **EXCAVATION, BACKFILLING, BEDDING AND RESEEDING**:

A. See Division 31 for other excavation, backfilling, bedding and reseeding requirements.

3.02 EXCAVATION:

A. Perform all excavation of every description and of whatever substance encountered to the depths required for installation of the work as indicated on the drawings or specified herein. The amount of trench opened at one time shall not exceed 200 feet including the backfilled portion of any trench which is not in condition for traffic. All excavated materials not required, or which are not suitable for backfill, shall be removed by the Contractor. Shoring shall be provided as necessary to protect existing facilities, new work, and the safety of personnel. Sheathing for duct banks (and manholes) trenches shall be left in place at the Contractor's expense. Provide cofferdams or other structures required for construction at no additional cost.

B. Trenches shall be necessary width for the proper laying of the duct bank with the banks as nearly vertical as practicable. Trench width at the top of the duct bank shall not exceed 8 inches on either side of duct bank. In rock excavation, the rocks shall be removed to a minimum of 6 inches from the sides of the duct bank. Trenches shall be excavated to a depth of 4" below the normal duct bank depth except where rock, shale or other hard material is encountered. Where rock, shale or other hard material is encountered, the trench shall be excavated to a depth of 4" below normal conduit depth. Care shall be taken not to excavate below the depths indicated. Unauthorized over depths shall be backfilled with No. 10 (Texas size) aggregate stone to levels previously specified. Whenever wet or otherwise unsuitable soil that is incapable of properly supporting the duct bank is encountered in the bottom of the trench, such soil shall be removed to the depth required as determined by the Engineer and the trench backfilled to the proper grade with material as specified above for over depth.

C. Trenches shall be of a depth that will provide a minimum 24" cover from top of conduit to finished grade, as hereinbefore stated, unless otherwise indicated.

D. Excavation for Appurtenances: Excavation for manholes, handholes, and similar appurtenances shall be sufficient to leave at least 12 inches in the clear between their outer surfaces and the embankment or shoring. Final earth supporting elevations shall be of bearing capacity for loads encountered. Rock and over depth shall be treated same as described for trench excavation. Manhole lid and frame shall be flush with finished grade.

3.03 INSTALLATION:

A. Installation of Underground Non-Metallic Raceways: PVC type 40 conduit, laid to true alignment and uniform grades, encased in 4" minimum monolithic poured concrete and steel reinforcement unless otherwise indicated in the Contract Documents. All bends to have exactly the right curvature and have regular tapered joints. Where connecting to manhole or pull boxes, use a bell end. Loose dirt in the bottom of the trench shall be well tamped previous to placing of conduit. Use pre-cast concrete or composition separators spaced not more than 5 ft. apart and secured to the conduits by hemp twine. Joints shall be staggered at least 6 inches and the tapered ends shall be given an application of solvent cement for PVC conduit to insure a good joint between the conduit and sleeve coupling. Conduit shall be thoroughly cleaned before installation. During construction and after the duct line is completed, the ends of the conduits shall be plugged. Care shall be taken to keep conduits clean of concrete, dirt, and any other substance. The concrete envelope shall be 3000 pound concrete. While the concrete is being placed, it shall be tamped between and around the conduits to insure a solid mass of concrete without voids. After underground raceway installation is completed, a flexible mandrel not less than 12 inches long, having a diameter approximately 1/4 inch less than the inside diameter of the conduit, shall be pulled through each conduit, after which a brush with stiff bristles shall be pulled through each conduit. The trenches shall not be filled until 72 hours after the concrete is poured. Ready-mix 3000 pound concrete is permitted (air entrained).

B. Installation of Pre-Cast Manholes: Manholes shall be installed in accordance with the excavation and backfilling specified herein. Manhole lid and frame shall project no more than 1/2 inch above finished grade.

3.04 BEDDING AND BACKFILLING:

A. Duct bank trenches shall be accurately graded to the duct bank level and thoroughly compacted as specified hereinafter. Trenches shall be backfilled, thoroughly haunched and tamped. Settling the backfill with water will not be permitted. The surface shall be graded to reasonable uniformity and mounded over trenches.

B. The precast manhole shall be accurately graded and bedded with No. 10 crushed stone to the base level and thoroughly compacted as specified hereinafter. The manhole shall rest firmly on the bedding. The excavation shall be backfilled, thoroughly haunched and tamped. Settling the backfill with water will not be permitted. The surface shall be graded to reasonable uniformity and mounded over excavation.

C. Compacted Backfill: All backfill material used in trenches under paved or future paved areas shall be classified as "compacted backfill". Backfill materials shall be approved excavated material, or other select material, as approved by the Engineer, free from large clods of earth, cinders, ashes, refuse, vegetable or organic matter, and rocks or stones over 1" dimension. Backfill from this duct bank to the top of the trench shall be placed in 6 inch layers and compacted to prevent future settlement. Methods and materials used in backfilling shall be provided to obtain 95 percent of maximum density at optimum moisture as determined by AASHO Standard T99, and as sufficient to prevent settlement of the pavement or surface.

D. Normal Backfill: For all backfill <u>not</u> under paved or future paved areas, backfill material shall be free from cinders, ashes, refuse, vegetable or organic matter, boulders, rocks or stones over 3" dimension. Backfill shall be placed and compacted in 6 inch layers to one foot above the top of the duct bank. The remainder of the backfill shall be placed in one foot layers and tamped.

E. The Contractor shall supply the backfill material as specified herein without additional cost to the Owner.

3.05 EXISTING UNDERGROUND UTILITIES:

A. The location of the existing underground utilities indicated on the drawings shall be considered approximate, and any locations may not be indicated or shown. The Contractor shall be responsible to have a thorough underground utility survey made in the path of the proposed underground utility work to locate and protect the known and unknown utilities, and to prevent disrupting the affected utility. The Contractor shall be responsible for repairing damage to any utility caused by their work.

B. Where any existing utilities are damaged, they shall be repaired as directed by the Engineer, with materials approved by the local utility company or the Owner, at no additional cost to the Owner.

3.06 SEPARATION OF UNDERGROUND RACEWAYS FROM OTHER UNDERGROUND UTILITIES

A. Where underground utilities are encountered, separation shall be provided as follows:
   1. Parallel Installation:
      a. Normal conditions: Duct banks shall be laid at least ten feet horizontally from a utility line or related manhole whenever possible, the distance shall be measured edge-to-edge.
      b. Unusual conditions: When local conditions prevent horizontal separation of ten feet, the duct bank may be laid closer to a utility line or related manhole provided that: The bottom of the duct bank shall be at least twelve inches above the top or below the bottom of the other utilities.
   2. Crossing:
      a. Normal conditions: Duct banks crossing other utilities shall be laid to provide a separation of at least 12 inches between the duct bank and the other utility whenever possible.

3.07 DISPOSITION OF DEBRIS:

A. The Contractor shall be responsible for removal from the property and disposal of all debris of whatever nature.

3.08 PROPERTY PROTECTION:

A. The Contractor shall be responsible for protecting all property and if damaged, repair to existing condition.

3.09 EROSION AND SEDIMENT CONTROL:

A. Precautions shall be taken throughout the duration of the project to prevent sediment throughout the excavated area, as required by the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit and the Texas Commission on Environmental Quality (TCEQ), and as shown on the drawings.

B. Erosion control measures shall be provided until the seeded areas are sufficiently prepared and accepted by the Owner.

3.10 CONNECTIONS TO EXISTING UTILITY SYSTEMS, ETC.:

A. All connections to existing utility systems, etc., shall be made as required or deemed necessary to insure the maintenance of continued operation of the above and provide the very minimum of interruption. This Contractor shall make such temporary connections as may be required to facilitate this work and to protect the existing systems from damage. Any work which will in any way affect the continued operation of any existing facility shall be coordinated with the proper authorities as well as the Engineer, and permission received, before any service is interrupted.

3.11 CUTTING AND PATCHING OF EXISTING WALKS, CURBS AND PAVEMENT:

A. All walks, curbs and pavement over trenches shall be restored to original condition and the Contractor will be responsible for any sinking in the walks, curbs, pavement or backfill which may occur within one year from acceptance by the Owner. All walks, curbs and pavement removed for trenching shall be saw cut before removal. Refer to other divisions for concrete paving specifications.

3.12 LAYING OUT THE WORK:

A. The Contractor shall lay out the work in accordance with the drawings, establish and maintain locations, lines, levels required for the work, and shall be responsible for its correctness. He shall report any discrepancies between the drawings and actual measurements to the Engineer for proper interpretation before proceeding with work affected by such discrepancies.

B. Prior to any excavation, the Contractor shall stake out the routes of the proposed underground electric and telephone/comm/data services for review by the Owner and Engineer. Minor deviations in the routing may be required.

3.13 VERIFYING MEASUREMENTS AND CONDITIONS:

A. The exactness of grades, elevations, dimensions, or locations given on the drawings, is not guaranteed by the Engineer. The Contractor shall, therefore, satisfy himself as to the accuracy of all grades, elevations, dimensions and locations. In all cases of interconnection of his work with existing or other work, he shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, locations, or dimensions shall be promptly rectified by him without cost to the Owner.

3.14 MISCELLANEOUS:

A. Grounding: Provide ground electrode(s) in each new manhole in accordance with N.E.C. and as covered by Section 26 05 26.

B. All manholes shall have pulling irons, cable racks, insulators and ladders. Refer to drawings for interior dimensions.

C. Exception: Underground CATV, telephone, and exterior branch circuit conduits do not require complete specified concrete encasement except where conduits intersect or parallel (within 10 feet) other underground utilities, cannot maintain the Code minimum burial depth below the finished grade or pavement, or are indicated to be encased. The specified concrete shall be required, where conduits change direction or at riser poles, for anchoring purposes during wire pulling procedures. Local utility's regulations or the Authority having jurisdiction's code for concrete encasement may nullify these exceptions.

D. Underground conduit dimensions (unless otherwise indicated): All primary and power conduit shall be a minimum 4" diameter. All communication conduit shall be a minimum 4" diameter.

E. Metallic detection tapes shall be installed at the 50% backfill depth (12" maximum).

F. Coordination is required with all existing and new underground utilities. Review all profiles indicated.

END OF SECTION

SECTION 26 0553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL:

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Prepare and paint Division 26 equipment supports and miscellaneous materials located in Equipment Rooms, Mechanical Rooms, and other utility areas housing mechanical and/or electrical equipment.

B. Identification of conduits, junction boxes, pull boxes, cabinets, panelboards, switchgear, motor starters, disconnect switches, motor protective switches, and Division 26 system enclosures.

1.03 WORK NOT INCLUDED:

A. Painting of factory finished Division 26 Equipment such as Switchboards, Panelboards, Emergency Generator Sets, etc.

1.04 RELATED WORK:

A. Division 23 – Mechanical

B. Section 26 05 00 – Common Work Results For Electrical

C. Section 26 05 33 – Raceway And Boxes For Electrical Systems

D. Section 26 05 36 – Cable Management For Electrical Systems

E. Section 26 22 00 – Low-Voltage Transformers

F. Section 26 24 16 – Panelboards

G. Section 26 28 16 – Enclosed Switches And Circuit Breakers

H. Section 26 29 00 – Low-Voltage Controllers

I. Section 26 36 00 - Transfer Switches

J. Division 27 – Communications

K. Division 28 – Electronic Safety and Security

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Except as otherwise specified, materials shall be the products of the following manufacturers:

1. Sherwin-Williams
2. Pratt and Lambert
3. Devoe
4. Benjamin Moore

2.02 MATERIALS:

A. Deliver all paints and materials to the project site in their original containers with all labels intact and legible at the time of use.

B. Sherwin-Williams Industrial Maintenance Coatings System 4000 products are listed below to establish color and a standard of quality.

1. All Hangers and Supports: One coat Series 54 Gloss Black Alkyd Enamel.
2. Uninsulated diesel engine exhaust and other similar hot surfaces shall be painted with two coats of No. B59S8 Heat Resistant Aluminum.
3. Exterior of belt guards and other protective guards shall be finished with two coats of Series 54 Alkyd Gloss Enamel No. SW4084 safety yellow color. Interior of and all items covered by belt guards and other protective guards shall be finished with two coats of No. SW4083 safety orange color.
4. Factory Finished Equipment finishes shall be cleaned and properly touched up with equipment manufacturers touch-up paint unless finish is severely damaged or of unacceptable quality. In the latter case, the entire finish shall be restored in accordance with painted procedures herein specified.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

A. The work shall be accomplished by qualified mechanics skilled in the painting trade. Painting of equipment and other materials shall not commence until all testing is complete and systems are ready for operation. Materials shall be evenly spread, and smoothly flowed on without runs or sags. Each coat shall be thoroughly dry before application of succeeding coats.

3.02 PROTECTION OF WORK:

A. The painters shall protect all adjacent surfaces with drop covers during the process of painting. Upon completion, paint spots, if any, shall be removed from all surfaces not intended to be painted.

3.03 PREPARATION OF SURFACE:

A. Surfaces to be painted shall be completely dry before applying paint. Metal surfaces shall be cleaned with mineral spirits before applying materials. Rust and scale shall be removed by wire brushing or sanding. Galvanized surfaces shall be chemically treated with crystalline zinc phosphate in strict accordance with the manufacturer=s recommendations. Surfaces shall not be painted when the temperature is, or is likely to be, near the freezing point, nor when they are exposed to hot sun.

3.04 IDENTIFICATION OF PIPES AND EQUIPMENT:

A. After **all** painting is completed, operating and control parts of the equipment and systems such as switchgear, panelboards, telephone cabinets, system cabinets, disconnect switches, motor starters and control cabinets shall be properly identified with laminated engraved plastic nameplates fastened with sheet metal screws, bolts or permanent adhesive. Pressure sensitive tape is **not** acceptable. Identification symbols or designations shall be the same as shown on the contract documents.

B. Boxes; Concealed and Surface Mounted: Each junction box, pullbox or similar enclosure shall be **neatly** identified by stencil marking which shall indicate service contained, and circuit numbers. Stencil letters shall be upper case (Capital) not less than one-half inch high and painted with Series 54 black gloss enamel.

C. Conduit:

1. Color bands shall be painted on each conduit where exposed or accessible. Bands shall be six inches wide and shall be placed along the conduit run immediately preceding the passage of the conduit through walls, ceiling or floor, and at each equipment connection or junction box. Where sub-bands are specified, they shall be two inches wide and centered in the color band. Adjacent to each color band, the abbreviation of the name of the service contained in the conduit shall be **neatly** stenciled. Stencil letters shall be one-half inch high upper case, applied with Series 54 black gloss enamel. Color bands shall be Series 54 Alkyd Gloss Enamel of colors listed below.

2. In lieu of painted color bands, the Contractor may use pressure sensitive tape a minimum of 2" wide. Each color band will require wraps as necessary to provide the full 6" wide band with or without the 2" sub-band.
3. In lieu of stenciled names of the pipe service, the Contractor may use vinyl "snap around" markers as manufactured by Seton, Bunting, Brady and Thomas & Betts (T&B).
4. Color Banding:

System	Abbrev./Color	Color Band	Color Sub-Bands
120/208 Volts (Normal)	208V/Black	Black	Yellow
120/208 Volts (Emergency)	208V/Red	Black	Yellow
277/480 Volts (Normal)	480V/Black	Black	Orange
277/480 Volts (Emergency)	480V/Red	Black	Orange
Fire Alarm	FA/Red	Red	Black
Security Access	SA/Black	Black	Brown
Surveillance CCTV	CC/Black	Black	Brown
Telephone System	TE/Black	Black	Blue
Data Network	DN/Black	Black	Blue
Direct Digital Control	DDC/Black*	Black	Blue
Building Intercommunications	IN/Black	Black	Green
Sound Systems	PA/Black	Black	Green
CATV	TV/Black	Black	Green
Audio/Video	AV/Black	Black	Green

D. The main panelboard, generator control panel, and other similar systems shall have an engraved informational laminated nameplate with the installing trade's name, telephone number and address for the Owner to obtain preventive maintenance, service or parts. The nameplate shall include the job order number, shop number or other identification which will identify the related equipment.

If the above address and telephone number is a branch office, the main office or manufacturers address and telephone number shall be included.

END OF SECTION

SECTION 26 0573

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

A. Short-Circuit analysis evaluation study

B. Protective Device Time-Current Coordination study

C. Field Adjustments To Equipment based on Study findings

1.03 RELATED WORK

A. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

B. Section 26 20 00 – Low-Voltage Electrical Distribution

C. Section 26 24 16 – Panelboards

D. Section 26 28 13 – Fuses

E. Section 26 28 16 – Enclosed Switches and Circuit breakers

1.04 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings
5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.

B. American National Standards Institute (ANSI):

1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
4. ANSI C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.

C. The National Fire Protection Association (NFPA)

1. NFPA 70 -National Electrical Code, latest edition

1.05 SUBMITTALS

A. Submit shop drawings in accordance with Section 26 05 00.

1. The studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the Engineer may be obtained for a preliminary submittal of data to ensure that

the selection of device ratings and characteristics will be satisfactory to properly select the distribution equipment. The formal study will be provided to verify preliminary findings.

2. The results of the short-circuit, protective device coordination study shall be summarized in a final report. A minimum of five (5) bound copies of the complete final report shall be submitted.

B. The report shall include the following sections:

1. Executive Summary including Introduction, Scope of Work and Results/Recommendations.
2. Short-Circuit Methodology Analysis Results and Recommendations
3. Short-Circuit Device Evaluation Table
4. Protective Device Coordination Methodology Analysis Results and Recommendations
5. Protective Device Settings Table
6. Time-Current Coordination Graphs and Recommendations
7. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

C. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

1.06 QUALIFICATIONS

A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the responsible charge and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.

B. The Registered Professional Electrical Engineer shall be an employee of the equipment manufacturer or an approved engineering firm.

C. The Registered Professional Electrical Engineer shall have a minimum of five (5) years of experience in performing power system studies.

D. The engineering firm shall have a minimum of twenty-five (25) years experience in performing power system studies.

1.07 COMPUTER ANALYSIS SOFTWARE

A. The studies shall be performed using one of the following software manufacturer programs:

1. CYME International, Inc.
2. EDSA Micro Corporation.
3. Electrical Systems Analysis, Inc.
4. SKM Systems Analysis, Inc.

1.08 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY ALLOWANCES:

A. Contractor shall provide the following allowances for the respective project types to offset any modifications required by the Overcurrent Protective Device Coordination Study:

1. Elementary School - $20,000.00
2. Middle School - $25,000.00
3. High School - $35,000.00

B. If the respective allowance is not used, the allow shall be retained by the Owner.

PART 2 - PRODUCTS

2.01 STUDIES

A. The contractor shall furnish a short-circuit and a protective device coordination studies. All studies to be prepared by equipment manufacturer.

2.02 DATA

A. Contractor shall furnish all data as required for the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

B. Source combination may include present and future motors and generators.

C. Load data utilized shall include existing and proposed loads obtained from Contract Documents.

D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.03 SHORT-CIRCUIT ANALYSIS

A. Transformer design impedances shall be used when test impedances are not available.

B. Provide the following:

1. Calculation methods and assumptions
2. Selected base per unit quantities
3. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.
4. The study shall include input circuit data including electric utility system characteristics, source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
5. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding adequacy or inadequacy of the equipment rating.
6. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.

C. For solidly-grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the engineer performing the study.

D. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short circuit ratings.
2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses.
3. Manufacturer shall notify Engineer in writing, of any circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE TIME-CURRENT COORDINATION ANALYSIS

A. Protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.

B. Include on each TCC graph, a complete title with descriptive device names.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.

D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

E. Plot the following characteristics on the TCC graphs, where applicable:

F. Electric utility's overcurrent protective device
   1. Medium voltage equipment overcurrent relays
   2. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands
   3. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands
   4. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves
   5. Medium voltage conductor damage curves
   6. Ground fault protective devices, as applicable
   7. Pertinent motor starting characteristics and motor damage points, where applicable
   8. Pertinent generator short-circuit decrement curve and generator damage point
   9. The largest feeder circuit breaker in each motor control center and applicable panelboard.

G. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

H. Provide the following:
   1. A One-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.
   2. A sufficient number of log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.
   3. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.
   4. The study shall include a separate, tabular printout containing the recommended settings of all adjustable overcurrent protective devices, the equipment designation where the device is located, and the device number corresponding to the device on the system one-line diagram.
   5. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
   6. Manufacturer shall notify Engineer in writing of any significant deficiencies in protection and/or coordination. Provide recommendations for improvements.

PART 3 - EXECUTION

3.01 FIELD ADJUSTMENT

A. Field adjustments to be completed by Manufacturer as part of this contract and prepare a report of all final settings.[V][O&M]

B. Contractor shall be responsible for making all modifications stated within these studies to the entire electrical system at no additional cost to the Owner. Contactor shall notify Engineer prior to making any modifications.

C. Provide allowances for changes to electrical gear per paragraph 1.8 listed above.

END OF SECTION

SECTION 26 0923

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Switches

B. Dimmers

C. Low Voltage Lighting Controls
   1. Wallpods
   2. Daylighting Sensors
   3. Occupancy Sensors

D. Low Voltage Lighting Control Equipment

E. Plates

F. Automatic Lighting Controls

G. Lighting Contactors

1.03 RELATED WORK:

A. Section 26 05 23 – Control Voltage Electrical Power Cables

B. Section 26 05 33 – Raceway And Boxes For Electrical Systems

C. Section 26 50 00 – Lighting

1.04 SUBMITTALS:

A. Submit shop drawings, product data and wiring device samples in accordance with Sections 26 05 00.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

C. Low Voltage Lighting Control Systems: Furnish the following for each system:
   1. Building floor plans (1/8” = 1’- 0” scale) showing:
      a. All lighting fixtures and low voltage control devices in their correct locations and configurations.
      b. Separate plans showing control zones and orientations for all daylighting sensors.
      c. Separate plans showing control zones and orientations for all occupancy and vacancy sensors.
   2. System riser diagrams showing connections to all lighting fixtures and low voltage control devices.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Switches [S] shall be as manufactured by:
   1. Bryant,
   2. Hubbell,
   3. Cooper-Crouse Hind

4. Pass and Seymour (P&S)

All switches shall be by the same manufacturer.

B. Dimmers shall be as manufactured by:
   1. Hubbell,
   2. Leviton,
   3. Lutron

C. Low Voltage Lighting Controls and Equipment [S] shall be as manufactured by:
   1. Sensorswitch,
   2. Hubbell,
   3. Lutron

D. Wiring Device Plates [S] and Blank Plates [S] shall be as manufactured by:
   1. Bryant,
   2. Hubbell,
   3. Cooper Crouse-Hinds,
   4. Pass & Seymour (P&S)

E. Lighting Contactors [S] shall be as manufactured by:
   1. Square D
   2. ABB
   3. ASCO

F. Automatic Lighting Controls shall be as manufactured by:
   1. Sensorswitch,
   2. Hubbell,
   3. Lutron

2.02 MATERIALS AND TYPE:

A. All switches, dimmers, and other wiring devices shall be as indicated on drawings and specified hereinafter.

B. Unless otherwise indicated on the drawings all switches shall be:
   1. Bryant "Tech-Spec" series,
   2. Hubbell HBL series (Industrial, Heavy-duty specification grade)
   3. Cooper Industrial Specification grade AC Quiet series
   4. Pass & Seymour (P&S) specification grade “PS” series

C. The switches shall be complete with green (brass) hexhead grounding screw, back and side wired high impact polycarbonate, LexanTM, high impact thermoplastic or nylon toggle. Switch shall be rated for the voltage, poles, amperage and circuit configuration required.

D. Plates: For all systems unless indicated otherwise.
   1. For Concealed Work: Stamped stainless steel type 302 with satin finish.
   2. OR
   3. High impact nylon, high impact thermoplastic or polycarbonate (Lexan) with smooth finish unless otherwise indicated. Color of plates shall be _____.
   4. For Wet Locations:
      a. While in Use (WL) (LP): Weatherproof NEMA-3R enclosure constructed of flame retardant U.V. stabilized polycarbonate, reinforced thermoplastic, die-cast metal or combinations of the above materials complete with sealing gaskets and stainless steel mounting screws; and meets OSHA and NEC requirements "WHILE IN USE". The cover shall be clear. Housing size shall depend on the wiring device being protected. Housing for receptacles shall allow both angled and straight cord connectors. As manufactured by Tay-Mac® Corp., P&S, Hubbell, Cooper Crouse-Hinds or acceptable equal.
      b. While cover is Closed (WP): Weatherproof NEMA-3R enclosure constructed of die-cast metal complete with sealing gaskets and stainless steel mounting screws; and meets

OSHA and NEC requirements while cover is "Closed". As manufactured by P&S, Bryant, Hubbell, Cooper Crouse-Hinds or acceptable equal.

5. For F.S. or F.D. Boxes (Interior Only): Die cast covers with gaskets, as manufactured by Crouse-Hinds, Appleton, Red Dot or acceptable equal.
6. Screws: Heads to match plate material and finish.
7. Provide blank plates for all unused outlets.

E. Wiring Device and Plate Colors: Architect will review and accept color of wiring devices and plates. Contractor shall allow for selection from "standard" colors (grey, white, ivory, brown) of wiring devices in his bid proposal.

F. All pilot lights shall be neon or L.E.D. type with Red color glass, unless otherwise noted. Lamp to be sized to adequately illuminate under daylight conditions. Incandescent pilot lights are not acceptable. LED conversion lamps are acceptable in incandescent lampholders.

G. Fluorescent Dimmers:

1. Dimmers shall be line voltage slider type (minimum 8A @ 120 volts, 6A @ 277 volts) with preset button and 3-way capability, unless indicated otherwise. Dimmer shall be compatible with the type of dimming ballast provided. Dimmers shall be Lutron #NF-103P series or acceptable equal to coordinate with the specified dimming ballast.

H. Low Voltage Lighting Controls:

1. Low Voltage Lighting Controls shall all have the following features:
   a. Fully addressable and compatible with Sensorswitch nLight control CAT-5e network.
   b. Complete with power supply and 2 RJ-45 ports.
   c. Shall be configured and engraved as specified here-in and as indicated on the drawings.
   d. 5 year product warranty.
2. Wallpods, Low Voltage [O&M] [S]:
   a. Graphic Wallpods:
      1) 3.5” Full-color touch screen.
      2) 16 On/Off/Dim controls and 16 scene controls with full user customization of all settings.
      3) Password protection for controls and set-up screens.
      4) Customizable screen saver image (.jpeg format) and onboard help screens.
      5) Operating temperature 14°F to 160°F.
      6) Sensorswitch nLight nPOD GFX or accepted equal by Hubbell or Lutron.
   b. Low Voltage Dimming and On/Off control Wallpods:
      1) 1, 2 or 4 channel raise/lower with 0-10V dimming control.
      2) 1, 2 or 4 channel on/off.
      3) Operating temperature 14°F to 160°F.
      4) Sensorswitch nLight nPODM DX or accepted equal by Hubbell or Lutron.
   c. Low Voltage Scene control Wallpods:
      1) Runs locally stored scenes.
      2) Runs remotely stored profiles from a gateway device. Remotely configurable and upgradeable.
      3) 1, 2 or 4 scene control.
      4) On/Off and Raise lower with 4 scene control.
      5) Operating temperature 14°F to 160°F.
      6) Sensorswitch nLight nPODM 1S/2S/4S or accepted equal by Hubbell or Lutron.
3. DayLighting Sensors, Low Voltage [O&M] [S]:
   a. Remotely configurable and upgradeable.
   b. Automatic Set-Point Calibration.
   c. Blink-back Set-Point (in footcandles).
   d. Set-Point (0-200 fc)
   e. Sunlight Discount Factor (1-8)
   f. Occupied Bright Level (0-100%)
   g. Unoccupied Dim Level (0-100%)
   h. Photocell On/Off Transition Time (45 sec. – 25 min.)

i. Adaptive cloud delay to prevent cycling on cloudy days.
j. Push-Button Programmable.
k. Full On/Off switching control.
l. Recessed Ceiling Applications: Sensorswitch nLight nRM ADCX series or accepted equal by Hubbell or Lutron.
m. Surface Ceiling Applications: Sensorswitch nLight nCM ADC series or accepted equal by Hubbell or Lutron.

4. Occupancy Sensors, Low Voltage [O&M] [S]:
   a. Recessed Ceiling Mounted:
      1) Dual technology; passive infrared and ultrasonic.
      2) Full 360° operation.
      3) Assorted lens choices for desired motion coverage.
      4) Minimum 24’ diameter small motion coverage at 9’ ceiling height.
      5) Minimum 48’ diameter large motion coverage at 9’ ceiling height.
      6) Sensorswitch nLight nRM PDT 9 (small motion) or nRM PDT 10 (large motion) or acceptable equals by Hubbell/Unenco, or Lutron.
   b. Surface Ceiling Mounted:
      1) Dual technology; passive infrared and ultrasonic.
      2) Full 360° operation.
      3) Assorted lens choices for desired motion coverage.
      4) Minimum 24’ diameter small motion coverage at 9’ ceiling height.
      5) Minimum 48’ diameter large motion coverage at 9’ ceiling height.
      6) Sensorswitch nLight nCM PDT 9 (small motion) or nCM PDT 10 (large motion) or acceptable equals by Hubbell/Unenco, or Lutron.
   c. Wall Mounted:
      1) Dual technology; passive infrared and ultrasonic.
      2) Full 120° operation.
      3) Small motion detection up to 40’.
      4) Large motion detection up to 70’.
      5) Beveled rear enclosure piece to facilitate corner mounting.
      6) Ceiling mounting bracket for mounting heights over 10’.
      7) Sensorswitch nLight nWV PDT 16 or acceptable equals by Hubbell/Unenco, or Lutron.
   d. Corridor Wall Mounted:
      1) Passive infrared technology.
      2) Long narrow motion.
      3) Linear coverage up to 130’ at 10’ mounting height.
      4) Ceiling mounting bracket for mounting heights over 10’.
      5) Sensorswitch nLight nHW 13 or acceptable equals by Hubbell/Unenco, or Lutron.
   e. High Bay Surface Mounted:
      1) Passive infrared technology.
      2) Full 360° operation.
      3) High bay and low bay lenses
      4) Minimum 30’ diameter detection at 15’ mounting height.
      5) Large motion detection at 35’ mounting height.
      6) Extra large motion detection at 45’ mounting height.
      7) Sensorswitch nLight nCM 6 or acceptable equals by Hubbell/Unenco, or Lutron.
   f. Wall Switch:
      1) Dual technology; passive infrared and ultrasonic.
      2) Full 180° operation.
      3) Minimum 40’ diameter small motion detection.
      4) Switching and dimming control.
      5) Sensorswitch nLight nWSX PDT LV series or acceptable equals by Hubbell/Unenco, or Lutron. Include raise/lower dimming control option (DX) where required.

I. Low Voltage Lighting Control Equipment:

1. Low Voltage Lighting Equipment Components shall all have the following features:
    a. Fully addressable and compatible with Sensorswitch nLight control CAT-5e network.
    b. Complete with power supply and 2 RJ-45 ports.
    c. Shall be configured and labeled as specified here-in and as indicated on the drawings.
    d. 5 year product warranty.
2. Power/Relay Packs for Low Voltage Lighting Control [O&M] [S]:
    a. Select the proper Power/Relay from the selection below.
    b. Linear Power/Relay Packs with dimming:
        1) For lighting fixtures capable of 0-10V dimming control that are not nLight capable from the factory.
        2) Maximum load 16A.
        3) Sensorswitch nLight nPP16 D Series Power Packs or acceptable equals by Hubbell/Unenco, or Lutron.
    c. Secondary Relay Pack with phase control dimming:
        1) For lighting fixtures requiring low voltage dimming control that are not 0-10V compatible.
        2) For 2 wire ballast or 3 wire dimmable ballast.
        3) Dimming ranges: High (0-100%), Low (0-100%).
        4) Dimming offset: (-200% to 200%).
        5) Requires CAT-5e power.
        6) Sensorswitch nLight nSP5 PCD series lighting control relay or acceptable equals by Hubbell/Unenco, or Lutron.
    d. For Switching of LED and T5 Fluorescent Lighting Loads:
        1) Maximum Load 16A.
        2) Combination unit includes power supply for up to 80ma. of bus load.
        3) Sensorswitch nLight nPP16 series or acceptable equals by Hubbell/Unenco, or Lutron.
    e. For switching of line voltage non nLight lighting loads:
        1) Maximum Load 16A.
        2) Sensorswitch nLight nSP16 series slave relay pack or acceptable equals by Hubbell/Unenco, or Lutron.
    f. For switching of low voltage non nLight lighting loads:
        1) Maximum Load 1A @ 40 VAC/VDC.
        2) Sensorswitch nLight nAR 40 series auxiliary low voltage relay or acceptable equals by Hubbell/Unenco, or Lutron.
3. Power Supplies [O&M] [S]:
    a. Power Supplies shall all have the following features:
        1) Power supplies shall operate on 120V and 277V power.
        2) Plenum Rated.
        3) Complete with elongated chase nipples for direct connection through a ½" knock-out to a standard junction box.
    b. For Bus and System Power over CAT-5e (80ma): Sensorswitch nLight nPS 80 series or acceptable equals by Hubbell/Unenco, or Lutron.
    c. For Power to nLight Bridges: Sensorswitch nLight PS 150 series or acceptable equals by Hubbell/Unenco, or Lutron.
    d. For Power to nLight Gateway Control Units and Gateway Touch Screens: Sensorswitch nLight PS 250 series or acceptable equals by Hubbell/Unenco, or Lutron.
4. Backbone Devices [O&M] [S]:
    a. Gateway:
        1) Automatically discovers nLight devices.
        2) 400 and 1500 device models available. Select the appropriate model based on the total amount of system lighting fixtures and devices.
        3) Provides system time clock.
        4) Provides an Ethernet interface for the required Sensorswitch SensorView software.
        5) Requires power supply as listed above.

6) Include one (1) Sensorswitch nLight nGWY2 GFX Gateway Touch Screen with each Gateway.
7) Sensorswitch nLight nGWY2 KIT or acceptable equals by Hubbell/Unenco, or Lutron.

b. Bridge:
1) Increases the number of lighting control zones in an nLight lighting control system.
2) Complete with 8 RJ-45 ports.
3) Connects zones of daisy-chained nLight enabled devices.
4) Acts as hubs to aggregate traffic from the connected downstream zones and as routers by forwarding information to the downstream zones.
5) Requires power supply as listed above.
6) Furnish required number of bridges necessary to completely connect all network devices to the gateway(s).
7) Sensorswitch nLight nBRG 8 series or acceptable equals by Hubbell/Unenco, or Lutron.

c. Wireless Communication:
1) Allows wireless communication to the nLight network using the required Sensorswitch SensorView software.
2) Furnish devices as necessary for full wireless communication with the nLight network.
3) Sensorswitch nLight nPP 16 WIFI or acceptable equals by Hubbell/Unenco, or Lutron.

J. Software Graphics [O&M] [S]: Furnish one master copy of Sensorswitch SensorView software, or accepted equal for the entire project which contains the following factory programming (Software shall be compatible with the latest version of Microsoft Windows® and Apple iOS®).:

1. A master graphic of the entire building, by floor, showing each and every nLight device installed in the project to include but not be limited to the following:
a. nLight capable lighting fixtures.
b. Lighting fixtures that are not nLight enabled, but are controlled by an nLight device.
c. Light Sensors.
d. Occupancy Sensors.
e. Wallpods.
f. Scene Controllers.
g. Power Supplies and Relays.
h. Bridges
i. Gateways
j. nPanels.
2. Allow for pan and zoom commands so smaller areas can be displayed on a larger scale simply by panning and zooming each floor's master graphic.
3. A mouse click on any nLight device shall display the following information (as applicable):
a. The device name.
b. The device catalog number.
c. The device configuration.
d. Replacement part numbers (Lighting fixtures):
1) LED Driver Part Number.
2) LED Card(s) Part Number(s).
4. Manufacturer shall also provide a mobile application with all features listed above compatible with Apple iOS® and Google Android®.

K. Lighting Contactors:

1. Lighting contactors shall be the mechanically held type, minimum 30A rated poles of number and amperage required, with factory wired controls:
a. Square D: Class 8903
b. ABB: A-Line
c. ASCO: 918 Series
d. Refer to detail on drawings.

L. Automatic Lighting Controls:
   1. Photocells by Precision Multiple Controls:
      a. Standard 120 Volts: #P2275 (1800VA - 120V)
      b. Standard 277 Volts: #P68275 (1800VA - 208 to 277V)
      c. FAA Type 120 Volts: #102FAA (1800VA - 120V only)
      d. Refer to detail on drawings.
   2. Timeclocks by Intermatic or acceptable equal as indicated below [O/M]:
      a. Intermatic ET2845C 365/7 day astronomic electronic control with independent 7 day and to the minute programming Astronomic programming, automatic daylight savings adjustment, 50 holiday blocks with schedules, manual operation. Non-volatile EEPROM memory. Includes four (4) independent output circuits. Controller shall operate from 120VAC-277VAC with auto voltage detection. 100 hour super capacitor eliminates battery dependency. Select proper enclosure for environmental condition encountered.
   3. Occupancy Sensors, Line Voltage [O&M] [S]:
      a. Ceiling or Wall-mounted: Provide dual technology (infrared and ultrasonic) occupancy sensors, complete with 120 or 277volt power packs for fluorescent lighting in indicated spaces. Sensors shall be ceiling or wall mounted as indicated as indicated on drawings. The local room switches shall be wired after the relay's contact. Provide a satellite relay for additional circuits under the sensor's control. Occupancy sensor shall be Watt-Stopper type DT-300 for 360 degree operation or DT-200 for 180 degree operation, or acceptable equals by Hubbell/Unenco, Sensorswitch, or Lutron.
      b. Corridor: Provide ultrasonic sensors, complete with 120 or 277 volt power packs for fluorescent lighting in corridors and elsewhere as shown on the drawings. Sensors shall be listed for coverage up to a minimum 90 foot linear distance. Sensor shall be Watt-Stopper Type WT-2255 or acceptable equal by Hubbell/Unenco, Sensorswitch, or Lutron.
      c. High Bay: Provide passive infrared sensors, complete with 120 or 277 volt power pack for fluorescent lighting in high bay areas where shown on the drawings. Include proper choice of lens for the application. Sensors shall be listed for minimum 24' diameter coverage when mounted at 20' height or 68' diameter when mounted at 40' height with proper application of lens. Sensor shall be Watt-Stopper HB series with L3 or L4 lens or acceptable equal by Hubbell/Unenco, Sensorswitch, or Lutron.
      d. Wall Switch: Provide single pole (2 wire) dual technology infrared (motion) and ultrasonic occupancy sensing wall switch where shown on the drawings, 800 watts @ 120 volts, 1200 watts @ 277 volts, 170 degree field of view. Switch shall be Watt-Stopper #DW-100 for single switches, #DW-200 for bi-level control, #DW-103 or #DW-203 for three-way switching or acceptable equals by Hubbell/Unenco, Sensorswitch, or Lutron.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. All wiring devices shall be mounted at elevations indicated.

B. Local switches shall be coordinated with the door swings to insure the proper location of the switch. Local switches shall be a minimum of 4" from door jamb trim. Refer to elevation for mounting outlet boxes at doors.

C. Install plates on all outlets and wiring devices, with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch. The use of sectional device plates will not be permitted.

D. Where the wall opening for a wall or casework outlet box is larger than a standard plate cover, repair the outlet opening to accept a standard size plate. "Jumbo" or "Junior Jumbo" device plates are not acceptable.

E. Low Voltage Dimming and ON/OFF Control System: Provide all components and wiring necessary for a complete and functioning Low Voltage Dimming and ON/OFF control system as indicated.

Furnish and Install all wallpods, occupancy sensors, lighting sensors, power supplies and dimming controls, cat 5e cable and miscellaneous appurtenances necessary for each complete and operating system. Drawing symbols indicate which lighting zones and spaces are to have low voltage (0-10V) Dimming and ON/OFF controls.

F. Daylighting Sensors and Controls: Daylighting sensors are shown in spaces with LED and fluorescent lighting fixtures. Daylighting sensors and controls shall sense and dim these lighting fixtures via nLight CAT 5e network control of the fixtures. Dimming shall begin with fixtures located closest to exterior fenestration, and work inward in the space a minimum of 15' as appropriate for even total illumination of the space (A combination of daylighting and controlled lighting). In all cases daylighting control strategies must comply with the IECC, 2012 Paragraph C405.2.

G. Occupancy Sensing and Control: The low voltage lighting control system shall be programmed as follows:
   1. When an occupant first enters a space with lighting enabled (fixtures off), the space shall illuminate to the 50% lighting power level. This requirement is based on ASHRAE 90.1, 2010 and applies to all spaces except those listed in Paragraph 9.4.1.a through d.
   2. At all times, the occupant's manual control of the space (via wallpods or network control) will override automatic controls.

H. Vacancy Sensing and Control: In spaces containing occupancy sensors with a 'vs' designation, occupancy sensors shall be programmed as vacancy sensors (wallpod 'on,' occupancy sensor 'off').

I. All solid state line voltage dimmers shall have dedicated neutral wiring from the panelboard to the fixture. Light track systems that have a shared neutral shall be wired in accordance with the dimmer and light track systems manufacturers' drawings and instructions.

J. Photocells shall be installed with view window oriented to the North and away from direct or reflected artificial or natural light sources. Mount photocell(s) 1'-6" above roof on condulet fitting and connected to circuits indicated.

K. Lighting contactors shall be installed in a NEMA enclosure rated for the environment encountered.

END OF SECTION

SECTION 26 2000

LOW-VOLTAGE ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Connections For:
   1. Kitchen Equipment
   2. Washers
   3. Dryers, Residential
   4. Ranges, Residential
   5. Motorized Shutters

B. Contactors and Relays

C. Special Voltages

D. Kitchen Hood Fire Suppression System Interfaces

E. Electric Door Strike

F. Connections for Fire Suppression Systems (Sprinklers Wet and Dry)

G. Smoke Shutter Release

H. Surge and Transient (ILCP) Protection

I. Emergency Panic Stop Station

J. Emergency Glass Break Switch

1.03 RELATED WORK:

A. Division 08 – Openings - Overhead Coiling Doors

B. Division 08 – Openings - Finish Hardware

C. Division 11 – Equipment - Projection Screens

D. Division 11 – Equipment - Laundry Equipment

E. Division 11 – Equipment - Food Service Equipment

F. Division 11 – Equipment – Scoreboard

G. Division 11 - Equipment - Laboratory Equipment

H. Division 12 – Furnishings

I. Division 14 - Conveying Systems

J. Division 21 – Fire Protection

K. Division 22 – Plumbing

L. Division 23 – Mechanical

M. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

N. Section 26 05 23 – Control Voltage Electrical Power Cables

O. Section 26 05 33 – Raceway And Boxes For Electrical Systems

P. Section 26 05 36 – Cable Management For Electrical Systems

Q. Section 26 05 53 – Identification For Electrical Systems

R. Section 26 09 23 – Lighting Control Devices

S. Section 26 27 26 – Receptacles

T. Section 26 28 16 – Enclosed Switches And Circuit Breakers

U. Division 27 – Communications

V. Division 28 – Electronic Security and Safety

1.04 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.
   1. Shop Drawings for contactors, relays shall include:
      a. Scale drawing of enclosure and internal components.
      b. Internal wiring schematic.
      c. Roughing-in requirements.
   2. Product Data: Submit application, technical, and installation data.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00 for contactors, relays, buck/boost transformers.

PART 2 - PRODUCTS

2.01 PRODUCTS:

A. Contactors and Relays:
   1. Shall be provided as required for proper circuit control. Each contactor shall have a hand-off-automatic switch and L.E.D. indicator [S] [O/M].
   2. Square D Class 8903, Type L lighting contactor in NEMA-1 enclosures. Select correct coil voltage, normally open and normally closed contacts, quantity of paired contacts. The installation shall include an **undervoltage relay** if required, to drop out contactor at 85% of normal voltage [S] [O/M].

B. Buck/Boost Transformers: Square D, Cutler-Hammer, G.E., Siemens, Hevi-Duty or acceptacle equal [S].

C. Emergency Panic Stop Stations (EPO): Emergency power off push button. Pushing the button shall turn off the associated power, and turning it on shall reset the button. The push button shall be red with a yellow housing and a flush, clear, weather-proof cover. Cover and housing shall state 'emergency power off'. product shall be STI SS2239ZA-EN or acceptable equal [S].

D. Isolated Loop Circuit Protector (ILCP) [S]:
   1. The ILCP furnished is to have a line to line response time of less than one (1) nanosecond capable of accepting greater than 2000 amps (35 joules each line) to earth. Shield to earth current is to be 5000 amps maximum.
   2. The ILCP is to be protected by a high dielectric insulating material and of small enough size to mount in a standard 4" square 2-1/8" deep electrical box.
   3. Spark gap devices or devices incorporated in or installed within various systems' control panels in lieu of the specified ILCP are not acceptable.
   4. All Isolated Loop Circuit Protectors must comply with UL #497B requirements.

E. Emergency Glass Break Switch (EGB): Asco #124 breakglass station with proper logo or acceptable equal [S].

F. Cord Reel: Industrial heavy-duty style cord reel with 45' long cord. cord reel shall have two (2) NEMA 5-20R outlets, adjustable stop, and a GFCI module. cord reel shall be by Hubbell or an acceptable equal [S].

G. Light Reel: Industrial style light reel with 45' long cord. Light reel shall have LED hand lamp with end light and adjustable stop. Light reel shall be by Hubbell or acceptable equal [S].

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General: Division 26 shall provide the installation methods specified hereinafter for the following equipment:

1. Kitchen Equipment
2. Washers
3. Dryers, Residential
4. Ranges, Residential
5. Motorized Shutters

All electrical work for receptacles or connections to the above equipment shall be made by the Electrical Trade. Do no roughing-in or other electrical work in these areas until roughing-in drawings reviewed by the Architect-Engineer are received. The presumed location of all presently envisioned equipment having electrical connections is shown on the drawings and specified herein, but this is for estimating purposes only and the Contractor shall prepare his bid to allow for any possible rearrangement of the equipment listed, or as indicated. Provide permanent liquid-tight flexible metal conduit connections to the equipment from the outlet boxes or conduit stubbed up above the floor or conduit stubbed down from the ceiling for all equipment indicated, except where receptacles are indicated. These connections shall include but not be limited to; disconnect switches, service switches, combination motor starters, motor protective switches and other wiring devices as required per the manufacturer’s drawings, the NEC and the Contract Documents.

B. Installation Methods:

1. Kitchen Equipment: Division 26 shall include in their bid the cost for providing wiring between components of the dishwasher and related accessories, the garbage disposal and solenoid, the fryer "battery's" fryers, filter and warmer, the walk-in refrigerator's condenser, evaporator, lights, door heat tape and timers, the walk-in freezer's condenser, evaporator, defroster, drain heat tape, door heat tape, pressure relief port heat tape, lights and timers, and other noted items. This electrical work is in addition to work specified in Paragraph 3.01 A.
2. Washers: Connect washer(s) on dedicated 120 volt circuit(s) indicated.
3. Residential Type Dryers: The bonding jumper between the unit's frame and neutral shall be deleted per NEC 250-140.
4. Residential Type Ranges: The bonding jumper between the unit's frame and neutral shall be deleted per NEC 250-140.
5. Motorized Shutters: The shutters shall be provided in-place by other Divisions. The control unit will be furnished by the shutter installing trade to Division 26 for installation. Division 26 shall provide all power and control wiring, and make all connections to the unit and controller in accordance with equipment manufacturer's drawings and instructions, and shutter installing trade's written instructions.
6. Equipment Wiring: Shall be in accordance with equipment manufacturer's drawings and instructions, and the equipment installing Trades' written instructions

C. Contactors and Relays: Install all contactors and relays in accordance with NEC as required.

D. Special Voltages: Some outlets and equipment are connected to the 277/480 volt system, 120/208 volt system and some low voltage systems. The Electrical shall be responsible for coordinating all related equipment and wiring to ensure that they are related for the voltage encountered. Low voltage wiring shall not be installed in the same conduits or boxes with the building service voltage wiring unless permitted by NEC.

E. Kitchen Hood Fire Suppression System:

1. Provide power connection to system as indicated.
2. Connect alarm and trouble contacts to building's fire alarm system.

3. Circuit breakers supplying kitchen cooking equipment under kitchen hood shall be supplied with shunt trips for connection by the Electrical Trade to the Kitchen Hood Fire Suppression System. All such circuit breakers shall trip in event of any actuation of the Kitchen Hood Fire Suppression System. Whether the hood supply and/or the exhaust fans shall be tripped off or remain fully or partially functional during fire suppression conditions shall be governed by the listings and instructions for both the hood and fire suppression systems.
4. All wiring shall be in accordance with Manufacturer's drawings and instructions and applicable codes.

F. Electric Door Strike:
1. All electric door strike mechanisms shall be furnished in-place by Division 8 on indicated doors.
2. Coordinate operation of the electric strike with all controls including Section 28 10 10 Electronic Access Control system. Division 26 shall provide all necessary controls, wiring, conduit, relays, connections not specifically specified as being provided under other Divisions.
3. If required, Division 26 shall provide a 120 VAC circuitry, protected transformer and/or power supply above the ceiling to coordinate proper voltage with the electric strike or provide the necessary power. Include any necessary control relays.
4. The electric strike shall be connected to the fire alarms 24 VDC door release circuit if door is part of the path of egress and manual unlatching (such as a panic bar) is not provided. Provide proper wiring and conduit as recommended by fire alarm system and electric strike manufacturer. Refer to Section 28 31 00.

G. Emergency Panic Stop Stations: Install stations to operate shunt trip (main) circuit breakers in panelboards as indicated. Provide engraved label with 1" high white letters on red background to read "POWER CUTOFF" with each station.

H. Electrical connections are required for the following items in Division 21 & 22:
1. Sprinkler Flow, Pressure and Tamper Switches, Post Indicator Valve Switch(es)
2. Pressure and Vacuum Switches for medical gases located on pipes, compressors, and vacuum pumps.

Refer to Plumbing and/or Fire Protection drawings for the exact location for MGO's, MGA's, pressure switches, flow switches, tamper switches (electrically supervised valves), vacuum switches, air compressors, vacuum pumps, electric heating cable (heat trace cable) and post indicator valves (also see Division 2).

I. Smoke Shutter Release:
1. Smoke shutters shall be furnished by other Divisions. Division 26 shall provide a release mechanism, and connect to the general alarm output **or** local smoke detectors auxiliary relays for release in accordance with NFPA.

J. Surge and Transient (ILCP) Protection: All power and control equipment, between the building and site facility shall have surge and/or transient protection devices to comply with UL and NEC requirements. The protection shall be on both sides.
1. Provide ILCP devices for the Fire Alarm System and other systems as required.
2. Provide ILCP devices in accordance with NEC Article 800.

K. Emergency Glass Break Switch:
1. Provide one (1) ASCO 124 break-glass switch to stop all gas-fired boilers and water heaters. Connect to boiler and gas water heater main control panel per manufacturer's drawings.

END OF SECTION

SECTION 26 2200

LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Three phase indoor dry type transformers.

B. Three phase indoor dry type transformers for non-linear loads.

1.03 RELATED WORK:

A. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

B. Section 26 05 23 – Control Voltage Electrical Power Cables

C. Section 26 05 26 – Grounding And Bonding For Electrical Systems

D. Section 26 05 33 – Raceway And Boxes For Electrical Systems

E. Section 26 05 53 – Identification For Electrical Systems

1.04 GENERAL DESCRIPTION:

A. Size, voltage ratings and features of transformers as indicated on drawings.

1.05 QUALITY ASSURANCE:

A. Source Quality Control: Dry type transformers shall be UL listed for application intended and specified temperature rise.

1.06 REFERENCES:

A. The transformer shall be designed and manufactured to meet the latest applicable NEMA publications such as ST-1, ST-20 and TR-27; UL Standards and NFPA-70. Specifically, all transformers shall comply fully with **(DOE 2016 Transformer Efficiency)** - regarding energy efficiency.

1.07 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.

1. Shop Drawings shall include:
   a. Dimensioned layout.
   b. All characteristics including KVA, phase, Hertz, primary volts and amps, secondary volts and amps, type class, weight, impedance, temperature rise, no-load loss in watts, sound level.
   c. Connection diagram.
2. Product Data: Submit application, technical and installation data.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Acceptable ventilated general purpose and high harmonic load **transformer** manufacturers are Square D, G.E., Cutler-Hammer, Siemens, ACME and Hevi-Duty.[S][O/M]

2.02 MATERIALS AND TYPE:

A. General Purpose Transformer(s):

1. Three phase units shall be 480 volts delta primary and 208Y/120V secondary with two 2-1/2% taps, FCBN and two 2-1/2% taps FCAN.
2. Units above 15KVA sizes shall be in ventilated sheet metal enclosures with louvers of such a design that they are "sight-tight" so that a wire or other similar object cannot be inserted through the ventilation louvers and touch interior parts having a voltage potential above ground.
3. All ratings called for shall be continuous full-load ratings. Transformers shall be designed for maximum of 80 degree Centigrade rise with minimum of 220 degree Centigrade class H insulation system and capable of 30% overload continuously at 40 degree Centigrade ambient. Units under 15 KVA shall be designed for maximum of 115 degree Centigrade rise with minimum of 220 degree Centigrade class H insulation system and capability of 15% overload continuously at 40 degree Centigrade ambient.
4. Enclosure or case temperature shall not be greater than 32°C above ambient. Terminal temperature shall not be greater than 5°C rise above ambient.
5. Sound level: Transformers shall be of the low noise design and sound levels shall be warranted by the manufacturer not to exceed the following (which may be less than the values prescribed in NEMA ST20):

Up to	50 KVA	39 dB
51 to	150 KVA	44 dB
151 to	300 KVA	49 dB
301 to	500 KVA	54 dB

6. The nameplate on each transformer shall list the following: KVA, Phase, Hertz, Primary Volts and Amps., Secondary Volts and Amps., Type, Class, Weight, Impedance, Temperature Rise, Catalogue Number, Serial Number, Transformer No-Load Loss in Watts, UL labeled.
7. Electrostatic shield bonded to enclosure.
8. Square D Type EX **(and EXN)** Series (**80°C** temperature rise) with copper windings is basis of design.

B. High Harmonic Load Transformer(s) For Non-Linear Loads:

1. Three phase units shall be 480 volts delta primary and 208Y/120V secondary with two 2-1/2% taps, FCBN and two 2-1/2% taps FCAN.
2. Units above 15KVA sizes shall be in ventilated sheet metal enclosures with louvers of such a design that they are "sight-tight" so that a wire or other similar object cannot be inserted through the ventilation louvers and touch interior parts having a voltage potential above ground.
3. All ratings called for shall be continuous full-load ratings designed for maximum of 115 degree Centigrade rise with minimum of 220 degree Centigrade class H insulation system.
4. Enclosure or case temperature shall not be greater than 32°C above ambient. Terminal temperature shall not be greater than 5°C rise above ambient.
5. Sound level shall not exceed the following dB at any sound level.

Up to	50 Kva	45 dB
51 to	150 Kva	50 dB
151 to	300 Kva	55 dB

6. The nameplate on each transformer shall list the following: KVA, Phase, Hertz, Primary Volts and Amps., Secondary Volts and Amps., Type, Class, Weight, Impedance, Temperature Rise, Catalogue Number, Serial Number, Transformer No-Load Loss in Watts, UL labeled.
7. Electrostatic shield bonded to enclosure.
8. 115 degree Centigrade maximum temperature rise with **non-linear** loads at 40 degree Centigrade ambient.
9. Reduced core flux to compensate for harmonic voltage distortion.
10. Double-size neutral terminal for non-linear neutral.
11. Additional winding capacity to compensate for higher stray loss due to non-linear loading.
12. A minimum K-factor of 4 or factor indicated on drawings.
13. Square D Type NL Series (**115°C** temperature rise) with copper windings is basis of design.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Mounting:
   1. Transformers shall be mounted so that vibrations and noise are not transmitted to the building structure.
   2. Wall mounted transformers shall be supported by manufacturer's standard wall brackets, with additional Kindorf channel as necessary.

B. Conduit connections shall be liquid-tight flexible conduit with stranded conductors to reduce any vibration/noise. Allow from 1/2 to a full loop of flexible conduit for vibration dampening.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Branch Circuit and Distribution Panelboards

B. Main Panelboard

1.03 RELATED WORK:

A. Section 26 05 53 – Identification for Electrical Systems

B. Section 26 28 16 – Enclosed Switches and Circuit Breakers

1.04 QUALITY ASSURANCE:

A. Integrated Circuit Breaker Panelboard Rating: Each panelboard, as a complete unit, shall have a rating equal to or greater than the integrated equipment rating shown on the panelboard schedule on the plans. Such rating shall be established by test with the circuit breakers mounted on the panelboard. The short-circuit tests on the circuit breaker and on the panelboard structure shall be made simultaneously by connecting the fault to each panelboard breaker with the panelboard connected to its rated voltage source. Method of testing shall be per proposed UL standards pertaining to listing of molded case circuit breakers for high-interrupting capacity ratings. The source shall be capable of supplying the specified panelboard short- circuit current or greater. Test data showing the completion of such tests upon the entire range of distribution and power panelboards to be furnished shall be submitted to the Engineer, if requested by him, with or before the submittal of approval drawings. Testing of panelboard circuit breakers for short-circuit rating only with the breaker individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable.

1.05 REFERENCES:

A. All enclosed circuit breakers and panelboards shall meet and comply with applicable sections of UL, NEC and NEMA.

1.06 SUBMITTALS:

A. Submit shop drawings in accordance with Section 26 05 00.

1. Shop drawings for each panelboard shall include:
    a. Dimensioned layout.
    b. **EXACT** Arrangement of circuit breakers or fusible switches as indicated in the schedules. (Automatic "Rejection" of shop drawings if not followed.)
    c. Bus ampacity, interrupting capacity and composition.
    d. Main lug capacity and location.
    e. Future provision.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. All panelboards shall be as manufactured by Square D or acceptable equal by Cutler-Hammer, G.E., or Siemens.

B. All replacement circuit breakers as indicated.

2.02 MATERIALS AND TYPE:

A. General:

1. Panels shall be dead front automatic circuit breaker as indicated and designed for type of service encountered.

B. **Panelboards** [S] [O/M]:

1. Breakers: Square D frame sizes are called for on the drawings to designate type of breaker to be installed. All breakers shall have a minimum interrupting capability of 18,000 amperes rms symmetrical or higher for 480 volt panels and 10,000 amperes rms symmetrical or higher for 120 volt panels as noted on drawings, and shall be U.L. listed. The breaker's line terminal connection shall bolt directly to the panelboard's bus connecting strap or shall be a bus bar clamp type connection with bolt on device. Multi-pole breakers shall be in one molded case, common trip, with one operating handle. Where space only is indicated, provide mounting straps for future breaker.
2. Cabinets and Trim: Cabinets shall be of all code gauge galvanized steel, 6" minimum outside depth, with studs for mounting interiors. Minimum of 4" side gutters; top and bottom gutters as required; special gutter sizes as indicated on the drawings. Raceway openings to be 2" clear from front of cabinet. Steel front shall be grey lacquered Code gauge (#12 gauge) minimum for 225 amp bus panelboards and smaller amperage types, and (#10 gauge minimum) for 250 amp bus panelboards and higher amperage types, complete with metal framed index card holder, door with flush latch, concealed hinges, lock (two keys for each panel with all panels keyed alike) concealed adjustable trim clamps or screws and **hinged** trim.
3. Interior:
   a. All bus structure shall be copper with silver, cadmium or tin plating and insulated. Provide individual full solid plated copper neutral bus and solid plated copper ground bus. The bus structure and main lugs, including any feed-through lugs, sub-feed (double) lugs and main circuit breaker where required, shall have the current ratings as indicated.
   b. Panelboards that are indicated to be “Non-Linear” shall have 200% plated copper neutrals.
   c. Provide mechanical screw type U.L. Listed lugs to accept solid and/or stranded copper and aluminum conductors for 90° C rated wire to accommodate the conductors indicated including derated conductors and oversized neutrals, as required.
4. Miscellaneous: Panelboards; that are indicated to be service equipment shall be rated and labeled for "Suitable for Service Entrance" by U. L.

C. Molded Case Circuit Breakers (MCCB) [S] [O/M] shall be as specified in section 26 28 16.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Set all cabinets of all branch circuit and distribution panelboards, with top 6'-0" above finished floor, unless noted otherwise, or unless panel is taller than 4'-6".

B. Index cards to be properly labeled with typewritten letters indicating loads controlled by each circuit complete with room designation matching the Owner’s final labeling.

C. Engraved laminated plates on breakers of main panels shall be filled in with the load designation.

D. Interior trims of all panels shall be pulled up flush with front covers.

E. Coordinate voltage of shunt trips with connected systems.

F. Branch circuit breakers serving the following items shall have lock-on devices.
   1. Exit signs
   2. Walk-through and/or exit (egress) lighting
   3. Fire alarm system(s)
   4. Security systems(s)
   5. Timeclocks
   6. Clock and Program Time Control System(s)
   7. Building Intercommunication Systems
   8. Telephone power disconnect switches and receptacles
   9. Sump pumps
   10. HVAC controls
   11. Refrigerators and Freezers.
   12. Control circuits for shunt trips and "panic" switches.
   13. Hand Dryers

G. Panelboards shall not be activated ("hot") without **all** protective covers and enclosures installed.

H. Electric Heating Cable Circuits:
   1. Provide 30 milliamp equipment protection circuit breakers for each electric heating (heat trace) cable circuit complete with dedicated neutral.
   2. Do not connect any heat trace cable without written verification of testing and acceptance of the installed heat trace cable by the cable manufacturer's authorized technician.
   3. Provide the minimum ampacity circuit breaker as indicated in Divisions 21, 22 & 23.

3.02 FIELD QUALITY CONTROL:

A. Technical Assistance: The panelboard manufacturer’s representative shall generally provide installation supervision of this equipment if requested by the contractor.

B. Calibration and Testing: The panelboard manufacturer’s representative shall provide a factory trained technician for initial calibration of circuit breaker trip and time delay settings to indicated values including ground fault protection system performance testing (NEC 230.95). All calibration and testing shall be in accordance with the manufacturer’s written instructions, NETA and all applicable codes and industry standards. Written records of the calibration and test procedures shall be submitted to the Owner, Architect/Engineer and Local Authority Having Jurisdiction (if required). These test procedures shall also include an insulation test, torquing of all connections, electrical interlocking verification, etc. The Architect/Engineer and/or Owner’s representative shall have the option of witnessing the testing procedures. The contractor shall coordinate the testing with all parties concerned.

END OF SECTION

SECTION 26 2726

RECEPTACLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Receptacles

B. Tamper Proof Receptacles

C. Plates

1.03 RELATED WORK:

A. Section 26 05 33 – Raceway And Boxes For Electrical Systems

1.04 REQUIREMENTS:

A. NEC 406 (Receptacles)

1.05 SUBMITTALS:

A. Submit shop drawings, product data and wiring device samples in accordance with Sections 26 05 00.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. **All Receptacles [S]** shall be as manufactured by:
   1. Cooper Industries
   2. Hubbell
   3. Pass and Seymour (P&S)

   All receptacles shall be by the same manufacturer.

B. Wiring Device Plates [S] and Blank Plates [S] shall be as manufactured by:
   1. Hubbell,
   2. Cooper Industries,
   3. Pass & Seymour (P&S)

   All plates shall be by the same manufacturer. "Wet Location" (WL) (LP) plate and covers by:
   1. Hubbell-Bell
   2. Hubbell-TayMac
   3. Legrand

2.02 MATERIALS AND TYPE:

A. All receptacles and other wiring devices shall be as indicated on drawings and specified hereinafter.
   1. Unless otherwise indicated on the drawings all standard duplex receptacles shall be:
      a. Hubbell heavy duty specification grade “HBL 5362” series,
      b. Cooper Industrial Specification grade “5362” series,
      c. Pass & Seymour heavy duty specification grade “5362” series.

The receptacles shall be complete with one-piece plated grounding system, self-grounding, back side wired, and high impact polycarbonate, Lexan™, or nylon faces. Receptacle shall be rated for the voltage, poles, amperage and NEMA configuration required. Provide the proper nylon or polycarbonate bodied plug where indicated for equipment connection.

2. Selected NEMA 5-20 receptacles shall be corrosion resistant type as manufactured by:
   a. Cooper Industries “CR” series or
   b. Hubbell "CM and M" series unless otherwise indicated on the drawings.
3. Selected NEMA 5-20 receptacles shall be ground-fault circuit-interrupter type as indicated. Ground fault circuit interrupting receptacles, unless otherwise indicated on the drawings, shall be equal to the same receptacles series specified in paragraph A.2. Provide corrosion resistant type where indicated.
4. Selected NEMA 5-20 receptacles shall be “Hospital Grade” as indicated, and shall be the same receptacle series specified in paragraph A.2.
5. All other NEMA configurations (amperage and type) shall be equal to the same receptacle series specified in paragraph A.2. Provide matching nylon or polycarbonate bodies plug to match receptacle for all connected equipment where the equipment is not furnished with plug.

B. All Tamper Resistant Receptacles shall be as indicated on the drawings and specified hereinafter.
   1. Unless otherwise indicated on the drawings all tamper resistant receptacles shall be:
      a. Cooper Industries TR8300 series.
      b. Hubbell 8300 series.
      c. Leviton 8300-SGT series
      d. P&S TR63H series.

      The tamper resistant receptacles shall be complete with a one-piece grounding system, self grounding, back side wired, and high impact polycarbonate, Lexan™, nylon or thermoplastic faces. Tamper resistant receptacles shall be hospital grade, tamper resistant with dual mechanical shutters and shall be rated for the voltage, poles, amperage and NEMA configuration required.

C. The weather resistant receptacles shall be complete with a one-piece grounding system, self grounding, back side wired, and high impact polycarbonate, Lexan™, nylon or thermoplastic faces. Receptacle shall be rated for the voltage, poles, amperage and NEMA configuration required. Provide the proper nylon or polycarbonate bodied plug where indicated for equipment connection.

D. Plates: **For all systems** unless indicated otherwise.
   1. For Concealed Work: Stamped stainless steel type 302 with satin finish.

      OR

      High impact nylon, high impact thermoplastic or polycarbonate (Lexan) with smooth finish unless otherwise indicated. Color of plates shall be _____.
   2. For Wet Locations, While in Use (WL) and Low Profile (LP): Weatherproof “Extra Duty” NEMA-3R enclosure constructed of die-cast aluminum complete with sealing gaskets and stainless steel mounting screws; and meets OSHA and NEC requirements **"WHILE IN USE"**. Housing size shall depend on the wiring device being protected. Housing for receptacles shall allow both angled and straight cord connectors, and shall incorporate a “cord catch” or “cord flap” gaskets.
      a. Hubbell-Bell “RaynGuard” 5800 series
      b. Hubbell-Taymac “CodeGuard” 5800 series.
      c. Legrand WIUCAST1 series.
   3. Screws: Heads to match plate material and finish.
   4. Provide blank plates for all unused outlets.

E. Wiring Device and Plate Colors: Architect will review and accept color of wiring devices. Contractor shall allow for selection from "standard" colors (grey, white, ivory, brown) of wiring devices in his bid proposal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. All wiring devices shall be mounted at elevations indicated.

B. All duplex receptacles shall be mounted vertical with ground slots towards floor, unless otherwise indicated by the Owner or Authority having jurisdiction.

C. Install plates on all outlets and wiring devices, with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch. The use of sectional device plates will not be permitted.

D. Where the wall opening for a wall or casework outlet box is larger than a standard plate cover, repair the outlet opening to accept a standard size plate. “Jumbo” or “Junior Jumbo” device plates are not acceptable.

E. Provide ground-fault interrupter type (GFCI or GFI) NEMA 5-20 receptacles where NEMA 5-20 receptacles are indicated in or at the following locations unless ground fault interrupter branch circuit breakers are indicated:

1. Bathrooms, showers, toilets, elevator pit(s), elevator machine room.
2. Within 6'-0" radius of all lavatories and sinks, and at **all** elevations.
3. All countertops in galleys and service pantries.
4. Receptacles that power refrigeration compressors, evaporators, etc., shall not be GFI protected due to inherent ground fault currents which will cause nuisance tripping, unless the receptacle device is located in a kitchen in which case it must be GFCI.
5. All other current IBC, NEC and OSHA GFCI required locations.

F. Low Profile (LP) Locations: Wiring device outlet boxes within 12” of the finished grade and located in laundry rooms, shower rooms, boiler rooms, HVAC equipment rooms, lavatories, and similar areas subject to wash-down, spray, or rinsing procedures shall be required to have wet location wiring device enclosures (WL) for “while-in-use” service. The NEC shall govern the requirement of a GFCI receptacle or similar device.

G. All exterior wiring device outlet boxes shall utilize weather resistant ground fault interrupter receptacles and wet location (WL) **"While in Use"** enclosures.

H. Each rooftop and grade mounted exterior Division 23 (HVAC) equipment shall be provided with a NEMA 5-20 weather resistant ground fault interrupter work receptacle in a FS/FD box and gasketed **“While in Use” (WL)** weatherproof enclosure in compliance with the NEC. Connect on nearest available circuit unless a circuit is indicated.

I. Division 26 shall furnish the polycarbonate or nylon angular plugs for the indicated equipment as required. Division 26 shall install the plugs on the equipment including proper specified flexible cable (cord).

END OF SECTION

SECTION 26 2813

FUSES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Fuses [S]

1.03 RELATED WORK:

A. Section 26 28 16 – Enclosed Switches And Circuit Breakers

B. Section 26 29 00 – Low-Voltage Controllers

1.04 SUBMITTALS:

A. Submit product data in accordance with Section 26 05 00.

1. Product Data: Submit application, technical, and installation data.

PART 2 - PRODUCTS [O/M]

2.01 MANUFACTURERS:

A. All Fuses shall be as manufactured by Cooper Industries, GEC Alsthon, Littlefuse, Gould-Shawmut (Nippon Mining). [S] [O/M]

B. **Fuse Cabinet** shall be as manufactured by the above fuse manufacturer, Hoffman, Austin or acceptable equal. [S]

2.02 MATERIALS AND TYPE:

A. Motor and Panelboard Fuses: Rejection type **C** class RK-1, dual element, time-delay, current limiting, cartridge type, by 300™ Low-Peak Yellow™ by Bussman, LoIp© by CEFCo, Power-Pro® by Littlefuse, "AMP-TRAP 2000" by Gould-Shawmut (Nippon Mining), with a minimum interrupting rating of 200,000 amperes rms symmetrical.

B. For applications 601 amps and higher, utilize time-delay, current limiting, silver linked **UL** class **"L"** fuses by 300™ Low-Peak™ Bussman, Short Check® by CEFCo, Power-Pro© by Littlefuse, A4BQ "AMP-TRAP 2000" by Gould-Shawmut (Nippon Mining) with a minimum interrupting rating of 200,000 amperes rms symmetrical.

C. Cabinet: Wall mounted enclosure complete with shelves for storage of spare fuses and instruction manual. Door shall be lockable with same key as panelboards.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Fuses for motor circuits shall be sized in accordance with the fuse manufacturer's sizing chart for **"motor running overload protection"**, unless otherwise required for a specific motor. All other fuses for other than motor circuits shall be of size and type as required by the connected equipment manufacturer's written instructions unless otherwise indicated. Labels indicating size and type of replacement fuses shall be glued to inside of door on all fusible switches, fusible motor starters and panels.

3.02 SPARE FUSES:

A. 600 Amp Fuses and Smaller: Furnish spare fuses not to exceed 10% of each rating with a minimum of three (3) per rating.

B. 601 Amp Fuses and Larger: Furnish three (3) spare fuses of each rating.

C. Contractor shall deliver the spare fuses with invoice to the Owner's Maintenance Operations Center.

END OF SECTION

SECTION 26 2816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Disconnect Switches

B. Circuit Breakers

1.03 RELATED WORK:

A. Section 26 05 53 – Identification For Electrical Systems

B. Section 26 20 00 – Low-Voltage Electrical Distribution

C. Section 26 24 16 - Panelboards

D. Section 26 28 13 – Fuses

E. Section 26 29 00 – Low-Voltage Controllers

1.04 REFERENCES:

A. All disconnect switches and circuit breakers shall meet and comply with applicable sections of U.L., N.E.C. and NEMA.

1.05 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.
   1. Shop Drawings for Disconnect Switches shall include:
      a. Scale drawing of enclosure and internal components.
      b. Roughing-in requirements.
   2. Circuit Breaker shop drawings shall include:
      a. Frame type and ampere rating.
      b. Trip amperage.
      c. Interrupting rating in RMS symmetrical amps.
      d. Accessories.
   3. Product Data: Submit application, technical, and installation data.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 - PRODUCTS [O/M]

2.01 MANUFACTURERS:

A. All disconnect switches shall be Square D (Group Schneider) Class 3110 Heavy Duty Visible-Blades® safety switches, General Electric Spec-Setter© Heavy Duty Type TH (to 600A), and Type TC (800A & 1200) safety switches [S][O/M], Cutler-Hammer/Eaton Heavy Duty Type DH series safety switches, and Siemens Vacu-Break VBII™ Heavy Duty safety switches.

B. All circuit breakers shall be as manufactured by Square D or acceptable equal by Cutler-Hammer/Eaton, General Electric (GE) or Siemens.

2.02 MATERIALS AND TYPE:

A. Disconnect Switches [S] [O/M]: Rated for voltage encountered, poles and amperage as required. Heavy Duty, NEMA enclosures, fusible for rejection type class R fuses only, solid neutral assembly, equipment grounding kit, unless otherwise indicated. Refer to NEMA type under PART 3 - EXECUTION.

B. Molded Case Circuit Breakers (MCCB) [S] [O/M]:
   1. Ratings and special features shall be as scheduled.
   2. Trips shall be thermal magnetic with inverse time delay and instantaneous time-current characteristics.
   3. 225 ampere frame and larger MCCB shall have permanent non-interchangeable trips, factory-calibrated at 40 degrees C, and adjustable magnetic feature set by a single adjustment. Interchangeable trips will be considered as an alternative.
   4. Industrial grade MCCB shall be provided except that commercial grade MCCB (quick-lag "Q-Line") may be used for MCCB 100 amperes and below where other indicated criteria are met.
   5. Ambient compensating MCCB shall be provided for outdoor applications or where indicated on drawings.
   6. MCCB shall not be used for switching lights unless they are specifically rated for switching duty.
   7. U.L. listed HACR type circuit breakers shall be provided for use with air conditioning, heating and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.
   8. Electronic Trip Circuit Breakers: Square D “Micrologic” trip system or accepted equal to include the following features (unless otherwise indicated in schedules):
      a. 100% Rated
      b. True RMS Sensing
      c. Interchangeable Trip Units
      d. LI, LIG, LS(I)G (Instantaneous OFF) Configurations (as scheduled)
      e. Short-time Delay = I^2t IN & 1^2t OUT
      f. Ground-fault Delay = I^2t IN & 1^2t OUT
      g. Short-time Withstand Rating
      h. Integral Ground-fault Testing
      i. LED Long-time Pickup Indication
      j. Zone Selective Interlocking (Short-time & Ground-fault) with main protective device and downstream protective devices
      k. Thermal & Magnetic Backup Protection
      l. Long-time & Ground-Fault Memory
      m. Local Trip Indicators - Overload, Short-circuit, Ground-fault
      n. Local Ammeter/Trip Indicator
      o. Trip unit seal kit
      p. Externally accessible test port
      q. High level selective over-ride
      r. Neutral Current Transformer
      s. One (1) universal test set, for the entire project, to be used for required test procedures prior to project completion.
   9. Circuit breakers shall have removable lugs. Lugs shall be UL listed for copper and aluminum conductors. Breakers shall be UL listed for installation of mechanical screw-type lugs and compression type lugs.
   10. Current limiting circuit breakers shall meet UL 489 requirements, NEMA Standard AB3-2013 and Federal Specifications W-C-375B/GEN.
   11. Combinations for series connected interrupting ratings shall be recognized by Underwriters Laboratories and shall appear in the Recognized Component Directory under the "Circuit Breakers - Series Connected" product category DKSY2. Current limiting circuit breakers shall allow the use of branch circuit breakers with lower interrupting capacities on systems capable

of delivering fault currents up to 200,000 rms symmetrical amperes at 480V ac and 100,000 rms symmetrical amperes at 600V ac.

12. Add-on ground fault modules (GFM) shall be a U.L. Listed circuit breaker accessory complete with adjustable time and levels, ground fault sensing device and relay, push-to-test button, indicator, neutral transformer, zone-interlock restraint interface module, and 120 volt control power for integral test. Provide a factory installed ground-fault shunt trip in related circuit breaker.

C. Fuses: Provide specified fuses, sizes as required.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Provide disconnect switches for all motors and appliances for the project where required by the National Electrical Code; and rated for the voltage encountered complete with required poles, amperage rating and all accessories. Not all disconnect switches required by NFPA-70 are necessarily indicated on the drawings.

B. All roof mounted fans shall have a disconnect switch (device) mounted under the hood by the Mechanical Trade. This switch (device) shall be wired in series with the firestats on the fans.

C. Provide rain-tight NEMA-3R, NEMA-4, NEMA-4X, explosion-proof or other NEMA enclosures for switches where required by NEC and environmental conditions.

D. Certain fusible disconnect switches shall be fully U.L. Service Equipment rated and labeled as indicated by the electrical distribution system.

E. Coordinate voltage of shunt trips with connected systems.

3.02 FIELD QUALITY CONTROL:

A. Technical Assistance: The electrical gear manufacturer's representative shall generally provide installation supervision of this equipment if requested by the contractor.

B. Calibration and Testing: The electrical gear manufacturer's representative shall provide a factory trained technician for initial calibration of circuit breaker trip and time delay settings to indicated values. All calibration and testing shall be in accordance with the manufacturer's written instructions, and all applicable codes and industry standards. Written records of the calibration and test procedures shall be submitted to the Owner, Engineer and Authority Having Jurisdiction (if required). These test procedures shall also include an insulation test, torquing of all connections, electrical interlocking verification, etc. The Engineer and/or Owner's representative shall have the option of witnessing the testing procedures. The contractor shall coordinate the testing with all parties concerned.

END OF SECTION

SECTION 26 2900

LOW-VOLTAGE CONTROLLERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Motor Protective Switches

B. Magnetic Starters, including across-the-line starters and reduced-voltage starters.

C. Variable Frequency Drives (VFD's), Installation of Division 23 VFD's

D. Control Accessories

1.03 RELATED WORK:

A. General: The Contractor shall consult all other sections of these Contract Documents specifications containing any type of equipment requiring electrical connections and allow for wiring and controlling all equipment as described therein even though not shown on the electrical drawings. See mechanical drawings for exact locations and names of Mechanical Equipment and Controls. (Division 23)

B. Division 23 - Mechanical

C. Section 26 28 13 - Fuses

1.04 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.
   1. Shop Drawings shall include:
      a. Scale drawing enclosure and internal components.
      b. Internal wiring schematic.
      c. Roughing-in requirements.
   2. Product Data: Submit application, technical, and installation data.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. All motor starters shall be as manufactured by Square D, Furnas, Cutler-Hammer/Eaton, G.E., Siemens, or Allen Bradley. All controllers and accessories to be by the same manufacturer.

B. Phase Protection Relays shall be by Diversified Electronics, Inc. (Available from Wesco, Johnson Control and others) or acceptable equal.

C. Interposing (Interface) Relays: Square-D or Potter-Brumfield.

2.02 MATERIALS AND TYPE:

A. Motor Protective Switches [S] [O/M]: Marked 'MP' on drawings. Manual type with overload relay for each phase, with poles as required and separately wired neon or L.E.D. pilot light. M.P. switch and pilot shall be mounted on one (1) multi-gang plate.

1. Magnetic Starters [S] [O/M]: Where M.S. is marked on the drawings, provide an across-the-line combination starter complete with the following:
2. Disconnect Switch: Fusible disconnect switch for rejection type Class RK-1 fuses only, unless non-fusible is indicated.

   OR

3. Motor Circuit Protector: Instantaneous trip magnetic-only circuit breaker with a single magnetic adjustment that sets all poles to the same trip current. Adjustment shall be continuous throughout the adjustable trip range.
4. Overload Relays [S] [O/M]:
   a. NEMA Size 00 to 4 Contactor: Factory calibrated, directly heated, **NEMA-10**, block design, three (3) pole, bi-metallic overload relay, and ambient temperature compensation.
   b. Current sensing solid state overload relays are not acceptable due to the non-automatic reset for unbalanced phase currents.
5. Indicating Lights: L.E.D. indicating lights for "power available" (green) and "run" (red). **Incandescent indicating light modules are not acceptable**, except with LED conversion lamps.
6. Control Voltage: Control circuits and holding coils shall be 120 volts. Provide individual transformers of required size where higher voltages are encountered. Protect control circuit in accordance with N.E.C.
7. **Reduced-Voltage (Part Winding) Combination Starters** [S] [O/M]: Unless indicated otherwise, all 480 volt, 3 phase, 20 horsepower and larger motors; or all 208 volt, 3 phase, 10 horsepower and larger motors shall be provided with part-winding combination motor starters complete with all specified accessories including oversized enclosures. Other types of reduced-voltage combination motor starters shall be as indicated. Coordinate all motor starters with Division 23 motors to ensure motors are setup to work with reduced-voltage starters.

B. **Heaters** [S] [O/M]: Install thermal overload heater elements in all switches and starters on the job whether or not the switches and starters are furnished by this subcontractor. Assume responsibility for proper application of motor running protection for all motors in accordance with the manufacturer's recommendations and the nameplate rating of the motors actually installed. All phases to have overload protection. (Not required on solid state overload relay.)

C. **Control Stations** [S]: Standard duty with maintained contact, start-stop buttons and red neon or L.E.D. indicating light, unless otherwise indicated. All start-stop buttons, hand-off-automatic switches, pilots, etc., mounted in covers of motor starters as required, unless noted otherwise.

D. **Enclosures** [S]: All motor starters and VFD=s shall have NEMA-1 **oversized** enclosures except motor starters in damp, wet or exterior (outdoors) locations shall have NEMA-3R oversized enclosures. Motor starters in kitchens and food preparation areas shall have NEMA-4X oversized enclosures.

E. **Phase Protection Relay (PLP)** [S] [O/M]: Provide Diversified Electronics, Inc., or accepted equal phase sequence and unbalance monitor, SLD Series, to monitor phase unbalance, under-voltage, phase sequence and regeneration. Monitor shall have adjustable phase unbalance, under-voltage and time delay (to break).

F. **Interposing (Interface) Relays** [S]: Square D #8501 RS 14 V20 (120 volt) relay(s) with #8501 NR45 socket, 5 amp contacts, control coil burden is 3.5 VA in rush and 1.2 VA sealed mounted in the **oversized** motor starter enclosure (bucket).

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Motors: All motors and motor-driven equipment will be provided in place by another Trade, ready for connection by the Electrical Trade with control equipment provided by the Trade who provides

the equipment unless specifically indicated otherwise. Motor branch circuits, etc., are designed for motor sizes as shown on the drawings. The motors and motor-driven equipment actually installed may vary from these sizes. The Electrical Trade shall verify actual sizes and notify the Engineer of any required changes.

B. Provide all required motor starters and motor protective switches, rated for the voltage encountered, complete with required poles, amperage rating and all accessories, unless indicated otherwise. Required motor starters may not be indicated on the electrical drawings. Refer to mechanical (and other divisions) equipment drawings and specifications for additional starter requirements, and provide starters as required. Provide all H.O.A. switches, L.E.D. pilots, auxiliary contacts, etc. in starters and M.P. Switches as required by Electric Sequence Control Diagrams. Provide all other control devices as called for by drawings and specifications. Provide "power available" and "run" L.E.D. indicating lights for all motor starters. The "power available" L.E.D. indicating lights are not necessarily indicated in the Electric Sequence Control Diagrams.

C. Variable Frequency Drives (VFD=s) (Furnished by Division 23):
   1. The qualified manufacturer's technical representative shall supervise the contractor's installation, testing, and start-up of all the drives furnished under Division 23. A maximum total of one (1) supervision day (8 hours) shall be provided by the manufacturer's representative.
   2. Division 26 shall provide assistance to Division 23 for system start-up. The VFD system start-up shall include a checkout of vibration at various frequencies through field observation and manufacturer's data on the driven equipment. Frequency deadbands shall be set-up for each point of equipment vibration.

D. Responsibility: The Mechanical Trade is responsible for the proper operation of the mechanical systems. The Electrical Trade is responsible for all electrical work in connection therewith.

E. Provide a motor protective switch in the cabinet of wall mounted unit heaters or fan coil units; and on one side of ceiling mounted units unless indicated otherwise. Position the switch to prevent the radiation from affecting the overload protection.

F. Motor Operated Dampers (MOD's): Division 26 shall interconnect all line voltage MOD's with Division 23 air-handling units and fans with proper voltage and ampacity wiring for sequence of operation as required by the Mechanical Drawings. Provide a 120 volt – 20 amp circuit from the next available spare breaker in the closest mechanical or receptacle circuit panel where a circuit is not specifically indicated on the drawings. MOD's may be connected as part of the motor control circuit, verify with the Division 23 Electric Sequence Control Diagrams.

G. Phase Loss Protection Relays shall be provided for the following three (3) phase equipment:
   a. All three (3) phase equipment as indicated to have "PLP" contacts on the Division 23 Electric Sequence Control Drawings. Select the monitor (relay) for the line voltage encountered.
   b. All three (3) phase (walk-in) refrigerators and (walk-in) freezers as instructed by Kitchen Equipment Installing Trade.
   c. All three (3) phase motors 10hp and larger.
   d. All Division 23 Variable Speed Drives.

   Phase loss protection relays shall be installed in the Division 26 motor starter **oversized** enclosures.

H. All motor starters shall be provided with sound isolation mounting when mounted adjacent to an occupied space such as corridor, office, classroom, auditorium, gym or similar space.

I. Install all motor protective switches adjacent to the panelboard serving the switch unless indicated otherwise on the drawing or Division 23 Electric Sequence Controls. Each switch shall be installed in an individual outlet box, arranged in vertical or horizontal rows. Provide recessed outlet boxes if the adjacent panel is recessed. Provide **cast type** single gang boxes if the adjacent panel is surface mounted.

J. Certain multi-speed fractional horsepower motors are indicated on the Division 23 Electric Sequence Drawings to have built-in overload protection in the motor in lieu of motor protective switches.

K. Provide interposing (interface) relays for the Division 23 microprocessor based building control system module relay output (and Section 28 31 00 Fire Detection and Alarm) if the system's output relay contact is overburdened.

L. All wiring within the motor starter (control) enclosure and to the motor shall be Type MTW stranded copper per Section 26 05 19 and Section 26 05 23.

M. Division 23 will furnish power factor correction capacitors with their motors over five (5) horsepower unless otherwise indicated. Division 26 shall install and connect these capacitors to cycle with the motors. The capacitors shall be connected on the motor side of the overcurrent protective device at the motor starter. The overcurrent device shall be adjusted to reflect the reduced line current. Size capacitor conductors per NEC Article 460.

END OF SECTION 26 29 00

SECTION 26 3600

TRANSFER SWITCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Automatic Transfer Switches

1.03 RELATED WORK:

A. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

B. Section 26 05 23 – Control Voltage Electrical Power Cables

C. Section 26 05 26 – Grounding And Bonding For Electrical Systems

D. Section 26 05 33 – Raceway And Boxes For Electrical Systems

E. Section 26 05 53 – Identification For Electrical Systems

1.04 DESCRIPTION; OPERATION

A. Description:

1. Each automatic switch shall consist of a power transfer module and a control module, interconnected to provide a complete system in a single NEMA-1 enclosure.
    a. Power Transfer Module:
        1) All main contacts shall be of silver composition. They shall be protected by arcing contacts in sizes 600 amperes and over. They shall be of the blow-on configuration and of segmented construction in ratings 600 amperes and over. The operating transfer time in either direction shall not exceed one-sixth (1/6) of a second.
        2) Inspection of all contacts (movable and stationary) shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to stop the contacts at any point throughout the entire travel to properly inspect and service the contacts when required.
        3) Automatic transfer switches utilizing components of molded-case circuit breakers, contactors, or parts thereof which have not been intended for continuous duty or repetitive load transfer switching are not acceptable. Automatic transfer switches shall be listed for emergency service as a complete factory assembled and tested apparatus, in accordance with requirements of NFPA-110.
        4) The automatic transfer switch shall be rated to withstand the rms symmetrical short circuit current available at the automatic transfer switch terminals with the type of over-current protection, voltage and X/R ratio as shown on the plans.
    b. Control Module: The control module shall be supplied with a protective cover and be mounted separately from the transfer switch for ease of maintenance. The interconnecting wiring harness shall include a disconnect plug to disconnect all wires including both sources of control power for routine maintenance. Sensing and control logic shall be solid-state and mounted on plug-in printed circuit boards. Printed circuit boards shall be keyed to prevent incorrect installation. Interfacing relays shall be industrial control grade plug-in type with dust covers.

B. Operation:

1. Four pole switches shall be used for three phase separately derived A.C. service with switched neutral. Neutral conductor terminal lugs shall be provided as required for the power system unless switch is on a 480 volt system which requires an overlapping switched neutral.
2. The automatic transfer switch control panel for three phase shall utilize solid-state sensing on normal and emergency for automatic, positive operation. The following shall be provided:
    a. For three phase switches all phases of the normal shall be monitored line-to-line. Close differential voltage sensing shall be provided on all phases. The pickup voltage shall be adjustable from 85% to 100% of nominal and the dropout voltage shall be adjustable from 75% to 98% of the pickup value. The transfer to emergency will be initiated upon reduction of normal source to 85% of nominal voltage and retransfer to normal shall occur when normal source restores to 90% of nominal.
    b. A time delay to override momentary normal source outages to delay all transfer switch and engine starting signals. The time delay shall be field adjustable from 0.5 to 6 seconds and factory set at 1 second.
    c. A time delay option that allows the user to adjust the time of transition from normal to emergency power and emergency to normal power.
    d. A time delay on retransfer to normal source. The time delay shall be automatically bypassed if the emergency source fails and normal source is available. The time delay shall be field adjustable from 0 to 30 minutes and factory set at 30 minutes.
    e. An unloaded running time delay for emergency generator cool-down. The time delay shall be field adjustable from 0 to 5 minutes and factory set at 5 minutes.
    f. A time delay on transfer to emergency. Initially set at zero but field adjustable up to 1 minute for controlled timing of load transfer to emergency, where indicated.
    g. Independent single phase voltage and frequency sensing of the emergency source. The pickup voltage shall be adjustable from 85% to 100% of nominal. Pickup frequency shall be adjustable from 90% to 100% of nominal. Transfer to emergency upon normal source failure when emergency source voltage is 90% or more of nominal and frequency is 95% or more of nominal.
    h. A contact that closes when normal source fails for initiating engine starting, rated 10 amps, 32 VDC. Contacts to be gold plated for low voltage service.
    i. A contact that opens when normal source fails for initiating engine starting, rated 10 amps, 32 VDC. Contacts to be gold plated for low voltage service.
    j. Green signal light to indicate when the automatic transfer switch is connected to the normal source. A red signal light to indicate when the automatic transfer switch is connected to the emergency source.
    k. One auxiliary contact that is closed when automatic transfer switch is connected to normal and one auxiliary contact that is closed when automatic transfer switch is connected to emergency. Rated 10 amps, 480 volts, 60 Hz AC.
    l. A test switch to momentarily stimulate normal source failure.
    m. Engine Generator exercising timer to select load or no-load operation with a reserve power for carryover.

1.05 REQUIREMENTS:

A. Standards:

1. The automatic transfer switch shall conform to the requirements of NEMA Standard ICS 2-447 and Underwriters' Laboratories UL 1008 and shall be UL listed as follows:
    a. For use in emergency and standby systems in accordance with Articles 517, 700, 701 and 702 of the National Electrical Code (NFPA-70) and NFPA-110.
    b. Rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric-heating and tungsten-filament lamp loads as referred to in Paragraph 30.9 of UL 1008.
2. The automatic transfer switch shall provide complete automatic operation to start the engine generator upon normal power failure to the transfer switch, and transfer the load automatically to the generator bus in ten (10) seconds or less, all in accordance with the latest editions of NFPA 70, 99 and 110.

B. Testing:
   1. Certified laboratory test data on a switch of the same design and rating shall be provided to confirm the following switching abilities:
      a. Overload and endurance at 480 volts AC per Tables 21.2, 23.1 and 23.2 of UL 1008 when enclosed according to Paragraph 1.6.
      b. Temperature rise tests after the overload and endurance tests to confirm the ability of the transfer switches to carry their rated current within the allowable temperature limits of the insulation in contact with current-carrying parts.
      c. No welding of contacts. Transfer switch must be operable to alternate source after the withstand current tests.
      d. Dielectric tests at 1960 volts, rms, minimum after the withstand current test.
   2. All production units should be subjected to the following factory tests:
      a. The complete automatic transfer switch shall be tested as to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
      b. The switch shall be subjected to a dielectric strength test per NEMA Standard ICS 1-109.21.
      c. The control panel shall meet or exceed the voltage surge withstand capability in accordance with IEEE Standard 472-1974 (ANSI C37.90a-1974) and the impulse withstand voltage test in accordance with the proposed NEMA Standard ICS-109.

1.06 SUBMITTALS:

A. Refer to Section 26 05 00 for submittal procedures.

B. Shop Drawings:
   1. Shop drawings shall include:
      a. Scale drawing of enclosure and internal components.
      b. Internal wiring schematic.
      c. Roughing-in requirements.

C. Product Data: Submit application, technical, and installation data.

D. Refer to Section 26 05 00 for submittal procedures for Operation and Maintenance Manuals.

E. Warranty, Service:
   1. The transfer switch manufacturer shall warrant the transfer switch for a minimum of two (2) years from date of acceptance by Owner against defective parts and/or workmanship and shall provide parts and labor to fulfill this warranty at no cost to Owner.
   2. Refer to Section 26 05 00 for submission of warranty.
   3. Major service and renewal parts service shall be readily available through authorized manufacturer's dealer located within 200 miles of this installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. The automatic or manual/automatic transfer switch shall be as manufactured by Automatic Switch Company (ASCo) whose number are used herein or accepted equal microprocessor type by Zenith Controls, or Russel Electric. Size and ratings are as indicated on the Drawings.

2.02 TRANSFER SWITCHES [S] [O/M]:

A. Automatic type: ASCo series 300 ADTS complete with:
   1. ASCo standard accessories #1, 2B, 2E, 3A, 4B, 5, 7, 9, 9A, 9B, 14A, 14B.
   2. ASCo standard accessories as required for NFPA-99 (110).
   3. ASCo accessories in addition to the other listed accessories:
      a. One (1) accessory #14A and two (2) accessory #14B for load control and limiting.

b. Accessory #27, in-phase solid-state monitor for transfer and retransfer of motor loads.
c. Accessory #28, overlapping neutral transfer contacts for proper ground fault sensing. The neutrals of the normal and emergency power sources shall be connected together only during the transfer and retransfer operation and remain connected together until power source contacts close on the source to which transfer or retransfer is being made. The overlapping neutral transfer contacts shall not overlap for a time duration greater than 100 milliseconds. A non-over-lapping neutral transfer (fourth) pole will be given consideration.
d. Accessory #33, equipment ground lug, solderless screw type.
e. Accessory #9C and 9D, signal lights to indicate if normal and emergency sources are powered up.
f. Accessory #63 double lugs on emergency terminals to drive non-transferred loads.
g. Accessory #11C exercising timer for engine generator, complete with toggle switch for no-load or load testing.

B. Enclosure shall be NEMA-1 containing the power transfer module, control module and all accessories.

C. The transfer switch KAIC rating shall be greater than the load side equipment (panelboard, disconnect switch, breaker) that the transfer switch is connected to KAIC rating. Refer to Riser Diagram and panelboard schedules for cabling and panelboard information.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install all of this equipment strictly in accordance with the manufacturer's instructions and roughing-in drawings.

3.02 TECHNICAL ASSISTANCE:

A. The transfer switch manufacturer's representative shall provide qualified electrical assistance to the Contractor in initial checkout of the unit on the job after completion of installation. The manufacturer's representative shall be responsible for making any adjustments that may be required on the transfer switch for proper performance. The manufacturer's representative shall also instruct the Owner's representative in the proper operation and care of this equipment.

3.03 MODIFICATIONS:

A. Contractor shall refer to drawings to determine special lug requirements.

END OF SECTION

SECTION 26 4300

TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Transient Voltage Surge Suppressors (TVSS)
   1. Service Entrance, TVSS-#1
   2. Separately Derived Services, TVSS-#2
   3. Panelboard, TVSS-#3

1.03 RELATED WORK:

A. Section 26 05 53 – Identification For Electrical Systems

B. Section 26 24 16 – Panelboards

1.04 DESCRIPTION:

A. General. The TVSS shall be a hybrid high-energy power conditioning filter incorporating transient voltage surge suppression and high-frequency electrical line noise filtering. The specified unit shall provide effective high-energy transient voltage suppression, surge current diversion, high-frequency attenuation, and line control in ANSI/IEEE C62.41-1991 environments connected on the load side of the facility's electrical distribution system as indicated. The unit shall be connected in parallel with the facility's wiring system.

B. Parameters: The TVSS shall meet or exceed the following electrical parameters.
   1. Unit Operating Voltage. The nominal unit operating voltage and configuration shall be as determined from the parameters of the circuit to which the TVSS is connected on the drawings.
   2. Maximum Continuous Operating Voltage (MCOV). The maximum continuous operating voltage of all suppression components utilized in the unit shall not be less than 125% of the facility's nominal operating voltage for 120 volt nominal systems and not less than 115% of the facility's nominal operating voltage for 480 volt nominal systems.
   3. Operating Frequency. The operating frequency range of the unit shall be 47 to 63 Hertz.
   4. Protection Modes. The unit's primary mode of protection shall be line-to-line and line-to-neutral. The secondary modes of protection shall be line-to-ground and neutral-to-ground. This results in 10 modes of protection.
   5. The Rated Single Pulse Surge Current Capacity. Based on ANSI/IEEE C62.41-1991's standard 8 x 20 microsecond current waveform, the rated single pulse surge current capacity, in amps, of the designated unit shall be no less than as follows:

TVSS-#1:		
200,000A	=	L-N
200,000A	=	L-G
200,000A	=	N-G
200,000A	=	L-L
400,000A	=	Per Phase

TVSS-#2:		
150,000A	=	L-N
150,000A	=	L-G
150,000A	=	N-G

150,000A = L-L
300,000A = Per Phase

TVSS-#3:
80,000A = L-N
80,000A = L-G
80,000A = N-G
80,000A = L-L
160,000A = Per Phase

In compliance with NEMA LS-1-1992, paragraphs 2.2.9 and 3.9, the system shall be single pulse surge current tested in all modes at rated surge currents by an industry-recognized independent test laboratory. Single pulse surge current capabilities of 200,000 amps or less are established by single-unit testing of all components within each mode. Due to present industry test equipment limitations, single pulse surge current capacities over 200,000 amps are established via testing of individual components or sub-assemblies within a mode. The test shall include a UL1449 Second Edition surge defined as a 1.2 x 50 Φsec, 6000V open circuit voltage waveform and an 8 x 20 Φsec, 500A short circuit current waveform to benchmark the unit's suppression voltage followed by a single pulse surge of maximum rated surge current (for units rated over 200,000A per mode, components or sub-assemblies are tested) magnitude with an approximated 8 x 20 Φsec waveform. To complete the test, another UL1449 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage measured from the two UL1449 surges does not vary by more than 10%.

6. Minimum Repetitive Surge Current Capacity. Per ANSI/IEEE C62.41-1991 and ANSI/IEEE C62.45-1992, the TVSS system shall be repetitive surge current capacity tested in every mode utilizing a 1.2 x 50 Φsec, 20 KV open circuit voltage, 8 x 20 Φsec, 10 KA short circuit current Category C3 bi-wave at one minute intervals without suffering either performance degradation or more than 10% deviation of clamping voltage at the specified surge current. The specified TVSS system shall be capable of withstanding the following category "C.3" impulses (per mode) without failure.

Repetitive Surge Current Capacity-Number of Impulses

TVSS Mark	# of Impulses
TVSS-1	>6,500
TVSS-2	>5,000
TVSS-3	>4,000

7. NEMA LS-1-1992 Clamping Voltage Data. All TVSS system clamping voltages shall be in compliance with test and evaluation procedures outlined in NEMA LS-1-1992, paragraphs 2.2.10 and 3.10. The maximum clamping voltages for the specified system shall be no higher than 700 volts @ category C.3 volts, for 480Y/277V unit and 330 volts @ category C.3 for 208Y/120V type unit. The clamping voltage numbers include the integral disconnect.
8. Unit UL1449 Second Edition Suppression Voltage Ratings. The UL1449 Second Edition listed suppression voltage ratings shall be published, as assigned by Underwriters Laboratories utilizing the test procedure described in UL1449 Second Edition Suppression Voltage Performance Testing.
9. High Frequency Extended Range Power Filter. The TVSS system's EMI-RFI noise rejection or attenuation values shall be in compliance with test and evaluation procedures outlined in NEMA LS-1-1992, paragraphs 2.2.11 and 3.11.

Atten. Freq.	**50KHz**	**100KHz**	**500KHz**	**1MHz**	**5MHz**	**10MHz**	**50MHz**	**100MHz**
	53dB	41dB	32dB	31dB	32dB	35dB	47dB	53dB

NOTE: Standardized insertion loss data obtained utilizing MIL-STD-220A 50 ohm insertion loss methodology. Noise source path = 100' to model maximum average circuit distance, filter connection distance = 6".

The TVSS system shall function in conjunction with other suppression filter devices of the same manufacturer via coordinated filters within the facility-wide suppression filter system that provide minimum noise attenuation as follows:

Atten. Freq.	50KHz	100KHz	500KHz	1MHz	5MHz	10MHz	50MHz	100MHz
	85dB	83dB	68dB	68dB	68dB	67dB	78dB	84dB

NOTE: Standardized insertion loss data obtained utilizing MIL-STD-220A 50 ohm insertion loss methodology, based on a minimum of 100 ft. of #4 AWG conductor between the two devices. Noise source = 100' to model maximum average circuit distance, filter connection distance = 6".

C. Overcurrent Protection
   1. Each suppression element shall be individually fused such that the failure of a single component or the operation of a single fuse element remains isolated and does not render the entire mode, or product, deficient by more than the 10%.
   2. Every electrical current carrying conductor shall be fused such that every fault is isolated at the point of the fault or at the device level.
   3. Fusing shall be present in all modes, including Neutral-to-Ground.
   4. All overcurrent/fault current protection shall be UL248-1 recognized as a stand-alone fuse.
   5. All fusing must be UL248-1 recognized and tested at 200kAIC. Testing shall be inclusive of all available product voltages.
   6. In accordance with UL248-1, all fuses and overcurrent/fault current devices must be tested with a 0.2 power factor.
   7. All fuses and overcurrent/fault current protection devices shall consist of self-arch-quenching, sand-encapsulated UL248-1 recognized fuse arrays. Each fuse shall be individually sealed in a manner that eliminates cross arching.
   8. The device shall be capable of withstanding the full single pulse surge current capacity for every mode without the operation or failure of overcurrent/fault current protection or fuses.

D. Transient Conduction Path: All full magnitude transient currents shall be conducted on low-impedance solid copper bussing. If printed circuit boards are utilized in surge current paths, no single trace shall be allowed to conduct more than the proportional current share of the connected TVSS component.

E. Environmental Requirements:
   1. Storage Temperature. Storage temperature range shall be -40º to +85ºC (-40º to +185ºF).
   2. Operating Temperature. Operating temperature range shall be -40º to +60ºC (-40º to +140ºF).
   3. Relative Humidity. Operation shall be reliable in an environment with 5% to 95% non-condensing relative humidity.
   4. Operating Altitude: The unit shall be capable of operation in altitudes up to 13,000 feet above sea level.
   5. Audible Noise: The unit shall not generate any audible noise.
   6. Magnetic Fields: No appreciable magnetic fields shall be generated. Unit shall be capable of use directly in Computer Rooms in any location without danger to data storage systems or devices.

1.05 QUALITY ASSURANCE:

A. Source Quality Control: Materials and equipment shall be new, unused and UL listed for use as a TVSS.

B. The TVSS shall be supplied by a USA manufacturer of established reputation and experience who shall have produced similar apparatus for a period of at least five (5) years and who shall be able to refer to similar installations rendering satisfactory service.

C. The Electrical Trade shall furnish the services of the TVSS manufacturer's authorized technical representative who is qualified in the installation and operation of the TVSS being provided, and who shall be qualified and experienced in the inspection, testing, and maintenance of TVSS units. This authorized technical representative shall be factory trained and certified by manufacturer of the TVSS being installed.

D. The above TVSS manufacturer's authorized technical representative shall be hereinafter known as the "TVSS Technician". The TVSS Technician and his employer shall be capable of providing testing and maintenance in accordance with UL's requirements. The TVSS Technician shall supervise the hook-up, final testing and adjustment of the TVSS, and provide instruction to the Owner's representative. The TVSS installation shall include wiring, components, connections, adjustment, testing and certification. The Electrical Trade shall provide conduit, wire, circuit breaker, and boxes as indicated, and required by the manufacturer's drawings or instructions. The TVSS manufacturer shall furnish any special back boxes, cabinets, enclosures and similar items to the Electrical Trade for installation by the Electrical Trade in accordance with the manufacturer's drawings and instructions, and as indicated.

E. Certification shall be submitted verifying that the TVSS installation is by the manufacturer's authorized representative.

1.06 REFERENCES:

A. Standards:

1. The TVSS shall be designed, manufactured, tested and installed in compliance with the following:
   a. Underwriters Laboratories (UL 1449 Second Edition and 1283)
   b. National Fire Protection Association (NFPA-70, 75 and 78).
   c. American National Standards Institute (ANSI).
   d. Institute of Electrical and Electronics Engineers (ANSI/IEEE C62.41-1991, Categories A, Band C3 and C62.45-1987).
   e. National Electrical Manufacturers Association (NEMA).
   f. ANSI/IEEE Std. 1100-1999 Section 8.6.1 (Emerald Book).
   g. ANSI C84.1, American National Standard for Electric Power Systems and Equipment – Voltage Ratings (60Hz).
2. The unit shall be UL 1449 listed as a Transient Voltage Surge Suppressor.

B. Testing:

1. Single Pulse Surge Current Capacity Testing: In compliance with NEMA LS-1-1992, paragraphs 2.2.9 and 3.9, each design configuration shall have the maximum single pulse surge current capacity per mode verified through testing. The test shall include a UL1449 Second Edition surge defined as a 1.2 x 50 Φsec 6,000V open circuit voltage waveform and an 8 x 20 Φsec 500A short circuit current waveform to benchmark the unit's suppression voltage, followed by a single pulse surge of maximum rated surge current magnitude with an approximated 8 x 20 Φsec waveform. To complete the test, another UL1449 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage found from the two UL1449 surges does not vary by more than 10%.
2. Minimum Repetitive Surge Current Capacity Testing. Each design configuration shall have a repetitive surge current capacity rating which shall be verified through testing. The test shall include a UL1449 Second Edition surge defined as a 1.2 x 50 Φsec 6,000V open circuit voltage waveform and an 8 x 20 Φsec 500A short circuit current waveform to benchmark the unit's suppression voltage, followed by a repetitive number of ANSI/IEEE C62.41-1991 Category C3 surges defined as a 1.2 x 50 Φsec 20,000V open circuit voltage waveform and an 8 x 20 Φsec 10,000A short circuit current waveform. To complete the test, another UL1449 surge shall be applied to verify survival. Survival is achieved if the suppression voltage resulting from the two UL1449 surges do not vary by more than 10%. Proof of such testing shall be the test log generated by the surge generator.

3. UL 1449 Second Edition Suppression Voltage Performance Testing. Each design configuration shall have a UL 1449 Second Edition Suppression Voltage Rating that has been tested and assigned by Underwriters Laboratories utilizing the following waveforms and procedures. The test shall be initiated with a surge of 6,000V / 500A, using waveshapes defined within ANSI/IEEE C62.41-1991 as a 1.2 x 50 Φsec open circuit voltage waveform and an 8 x 20 Φsec short circuit current waveform, to benchmark the unit's suppression voltage. The unit shall then be subjected to 10 positive polarity and 10 negative polarity 1.2 x 50 Φsec 6,000V open circuit voltage waveforms and an 8 x 20 Φsec 3,000A short circuit current waveform. For comparison with the initial benchmark voltage reading, another ANSI/IEEE surge defined as 1.2 x 50 Φsec 6,000V open circuit voltage waveform and an 8 x 20 Φsec 500A short circuit current waveform shall be applied. Deviation from initial to final clamping voltage may not exceed +/ - 10%. Upon successful completion, an appropriate UL1449 Second Edition Suppression Voltage Rating is assigned by Underwriters Laboratories.
4. Short Circuit Fuse Testing: Each design configuration shall be short circuit tested in accordance with the type of fusing utilized in the suppression path. Testing shall include application of a sustained overvoltage that causes the unit to enter a bolted fault condition. This bolted fault condition shall occur with the full rated A/C current of the fuse available. The fuse shall fail in a safe manner with no physical or structural damage to the unit and any failure shall be self-contained within the unit.
5. Surge Current Fuse Testing: Each design configuration shall be surge tested with fusing in series to verify that a transient of maximum surge current capacity magnitude is fully suppressed without fuse failure, operation, or degradation.
6. MCOV (Maximum Continuous Operating Voltage) Testing: Each unit shall be factory tested at the applicable MCOV to assure proper field operation.
7. Quality Assurance Testing. Each unit shall be thoroughly factory tested before shipment. Testing of each unit shall include, but shall not be limited to, UL manufacturing and production-line tests, quality assurance checks, MCOV and clamping voltage verification tests.
8. Start-Up Testing. Upon completion of installation, a factory-certified local service technician shall provide testing services. The following tests shall be performed: (a) voltage measurements from Line-to-Ground, Line-to-Neutral, Line-to-Line, and Neutral-to-Ground at the time of the testing procedure, (b) impulse injection to verify the system suppression voltage tolerances for all suppression paths. Impulse testing shall be completed while the unit is off-line to isolate the unit from the distribution system. Test results shall be recorded and compared to factory benchmark test parameters supplied with each individual unit. A copy of the start-up test results and the factory benchmark testing results shall be supplied to the engineer and the owner for confirmation of proper suppression filter system function. In addition, the integrity of the neutral-ground bond should be verified through testing and visual inspection. A Ten Year Limited Warranty shall initiate after the owner has accepted the testing results and taken possession of the equipment.

1.07 SUBMITTALS:

A. Refer to Section 26 05 00 for submittal procedures.

B. Shop drawings shall include:
   1. Scale drawing of enclosure and internal components.
   2. Internal wiring schematic.
   3. Roughing-in requirements.

C. Product Data: Submit application, technical, and installation data.

D. Refer to Section 26 05 00 for submittal procedures for Operation and Maintenance Manuals.

E. Warranty, Service:
   1. The manufacturer shall provide a Ten Year Limited Warranty from the date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation, and maintenance instructions. The warranty shall cover overexposures. The warranty shall cover all parts, labor, and material to return the unit

to serviceable condition. A factory trained local representative located within 250 miles of the jobsite shall provide on-site labor and system testing, if required, during the warranty period. The local representative shall own and operate test equipment capable of determining the clamping voltages of the systems provided on the project.

2. Refer to Section 26 05 00 for submission of warranty.
3. Major service and renewal parts service shall be readily available through authorized manufacturer's dealer located within 200 miles of this installation.

PART 2 - PRODUCTS [S] [O/M]

2.01 MANUFACTURERS:

A. Surelogic (Square D), or acceptable equal by APT, Liebert, EFI Electronics, Surge Suppression Inc. or General Electric (G.E.) only. No other TVSS manufacturers will be considered or approved.

2.02 MATERIAL:

A. Suppression System. The TVSS system shall include an engineered solid-state suppression system utilizing arrays of non-linear voltage dependent metal oxide varistors with similar operating characteristics. To maximize current density the device shall contain sufficient thermal mass allowing the device the ability to dissipate large amounts of average power that may be caused from sustained over-voltage events and voltage swells as well as repetitive transient impulses. The suppression system components shall optimally share surge currents in a seamless, low-stress manner assuring maximum performance and proven reliability. The suppression system shall not utilize silicon avalanche diodes (SADs) or other components which might short or crowbar the line, thus leading to interruption of normal power flow to or system upset of connected loads.

B. High Frequency Extended Range Power Filter. The TVSS system shall include a high frequency extended range power filter and shall be UL1283 listed as an Electromagnetic Interference Filter. The filter shall reduce fast rise-time, high frequency, error-producing transients, and electrical line noise to harmless levels, thus eliminating disturbances which may lead to electronic system upset. The filter shall provide minimum noise attenuation as specified in section 2.10 of this specification.

C. Internal Connections. All full magnitude transient currents shall be conducted utilizing low-impedance copper bus bars. No plug-in component modules or quick-disconnect terminals shall be used in surge current-carrying paths.

D. Internal and External Mounting: TVSS devices may be externally mounted or internally mounted inside switchboards or panelboards. TVSS shall meet all other requirements herein regardless of mounting. Internally mounted TVSS shall be factory installed and certified by the switchgear manufacturer and shall in no way affect the U.L. listing of the switchgear. The Contractor shall be responsible for insuring where switchgear size increases to support internally mounted TVSS, that the switchgear will fit in the allotted space shown on the drawings.

E. Field Connections. The TVSS system shall include mechanical or compression lugs for each phase, neutral and ground, if applicable. The system shall be capable of connection up to a #2 AWG copper wire size.

F. Field Installation. The unit shall be installed as close as practical to the facility's wiring system in accordance with applicable national/local electrical codes and the manufacturer's recommended installation instructions.

G. Enclosure. Standard unit shall be supplied in a NEMA 4 metallic enclosure. Enclosure sizes and weights shall not exceed 28@H x 16@ W x 9.5 AD. The weight shall not exceed 91 pounds.

H. The TVSS shall be provided with an integral monitoring option as specified below:

1. Dual Form "C" Dry Contacts: The TVSS system shall be provided with 2 sets of form "C" dry contacts (normally open and normally closed) to facilitate connection to a building management system or other remote monitoring system. The contacts shall be normally open or normally closed and shall change state upon failure of the suppression system or power

loss in any of the phases. The contacts shall be optically isolated to insure transient energy does not "jump" over to the monitoring circuit.

2. Display Event Counter**:** The TVSS system shall be provided with a display event counter that makes available the cumulative number of transients the device has been subjected to. The detection circuitry must be current sensing to eliminate erroneous counts that may be produced from stray voltages and noise signals, both conducted and radiated. The event counter shall have a ten year lithium battery to provide back-up in the event of a power outage or when the unit is disconnected for service.
3. Battery Powered Audible Alarm and LED Indicators: The TVSS system shall be provided with a battery powered audible alarm that detects and provides notification of single or multiple phase failure of the suppression filter system. The alarm shall have a silence switch as well as a test switch for ensuring positive function and an alarm LED that illuminates when the alarm is disabled. The monitoring unit shall have an easily replaceable, commonly available battery for backup to ensure audible alarm function in the event of a total power failure. The unit shall have a battery backed-up monitor LED which shall illuminate when battery requires replacement.

I. INTEGRAL DISCONNECT SWITCH:

1. The device shall have a NEMA designed and certified safety interlocked integral disconnect switch located within the unit with an externally mounted metal manual operator. The disconnect shall be fused and rated for a minimum of 200 amps.
2. The switch shall disconnect all ungrounded circuit conductors from the distribution system to enable testing and maintenance without interruption to the facility's distribution system.
3. The switch shall be rated for 600VAC.
4. The TVSS device shall be UL1449 Second Edition listed with the integral disconnect switch and the UL1449 Second Edition Suppression Voltage Ratings shall be provided.
5. The integral disconnect switch shall be capable of withstanding the published maximum surge current magnitude without failure or damage to the switch.
6. The integral disconnect switch is required, unless a supply breaker is located in the adjacent panelboard or switchboard to provide an individual overcurrent protection and disconnecting means. For existing installations, the Engineer must approve the use of an existing supply breaker in advance of the product submittal before waiving the requirement of an integral disconnect switch.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The TVSS system along with the remote status alarm contacts shall be installed including all connections, at the location and as indicated on the drawings and wiring diagrams as specified herein, and in accordance with the accepted shop drawings, the manufacturer's instructions, and the manufacturer's standard specification and dimension sheets.

B. The auxiliary monitor contacts shall be connected to the local DDC as an alarm point. Division 23 shall provide the wiring with Division 26 supervising the connection at the TVSS. Division 26 shall provide a non-metallic conduit within the TVSS enclosure for isolation.

3.02 FIELD QUALITY CONTROL:

A. Technical Assistance: The TVSS manufacturer's representative shall generally supervise installation of this equipment with the Contractors concerned providing up to four hours of job supervision during the job.

B. Initial Start-Up and Checkout: The TVSS manufacturer's representative shall provide a qualified technical representative to assist the Contractor in initial checkout of the system or the job after completion of installation. The manufacturer's representative shall be responsible for field testing making any adjustments that may be required for proper performance. The manufacturer's

representative shall also instruct the Owner's representative in the proper operation and care of this equipment.

C. Field Testing: Upon completion of initial start-up and system checkout, the technical representative of the TVSS shall perform a field test, with the Engineer notified in advance.

END OF SECTION

SECTION 26 5000

LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Lighting Fixtures

B. Wires and Cables, Under 600 Volts.

C. Connectors and Lugs, Under 600 Volts

D. Lamps

E. Drivers

1.03 RELATED WORK:

A. Division 9 – Finishes

B. Section 26 05 00 – Common Work Results For Electrical

C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

D. Section 26 05 23 – Control Voltage Electrical Power Cables

E. Section 26 05 26 – Grounding And Bonding For Electrical Systems

F. Section 26 05 33 – Raceway And Boxes For Electrical Systems

1.04 REFERENCES:

A. The complete fixture and installation method including the lamps, fixture construction, ballast, sockets, wiring, raceway, suspension system, fixture environment shall be in accordance with:
   1. 2024 International Building Code.
   2. N.E.C.
   3. Fixture and application use listed by U.L. Inc.
   4. Where applicable, all lamps shall meet the National Energy Policy Act (EPCA) of 1992.
   5. Where applicable, all fluorescent ballasts shall meet the minimum efficiency standards of Public Law No. 100-357, National Appliance Energy Conservation Amendments of 1988 (NAECA).
   6. All above references shall be current issue in effect at time of bid.

1.05 SUBMITTALS:

A. Submit shop drawings and product data in accordance with Section 26 05 00.
   1. Shop Drawings shall include:
      a. Photometrics.
      b. Dimensions.
      c. Roughing-in requirements.
      d. Point by point footcandle study for exterior post lighting.
   2. Product Data: Submit application, technical, and installation data.

B. Submit Operation and Maintenance Manuals in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. **Lighting Fixtures:** Lighting fixture manufacturer's names and catalog numbers are noted on drawings and are used to designate the type, general design, size, quality, etc., of fixtures desired [S][O/M][V].

B. **Lamps [S]:**

1. Fluorescent:
   a. Rapid Start Fluorescent Lamps (T8 bulb, color temperature = 4100ºK, CRI = 85):
      1) 24" length, 17 watts, 1325 lumens. Philips F17T8/TL841.
      2) 48" length, 32 watts, 2950 lumens. Philips F32T8/TL841.
      3) U-bent, 6" spacing; 22-7/16" length, 33 watts, 2800 lumens. Philips FB32T8/TL841.
   b. T8 High Output (HO) Fluorescent Lamps (Color temperature = 4100ºK, CRI = 85): 96 inch length, 86 watts, 8200 lumens. Philips F96T8/TL841.
   c. T5 and T5HO Programmed Start Fluorescent Lamps (color temperature = 4100°K, CRI = 85):
      1) 46” T5 (4’ nominal) length, 28 watts, 2900 lumens. Philips F28T5/841/ALTO. (T5HO = 54 watts, 5000 lumens - Philips F54T5/841/HO/ALTO).
      2) 22” T5 (2’ nominal) length, 14 watts, 1350 lumens. Philips F14T5/841/ALTO. (T5HO = 24 watts, 2000 lumens - Philips F24T5/841/HO/ALTO).
   d. Compact Fluorescents (PL-C bulb, color temperature = 4100ºK, CRI = 82):
      1) 6" length, 18 watts, 1250 lumens. Philips PL-C 18W/841/ALTO.
      2) 6-13/16" length, 26 watts, 1800 lumens. Philips PL-C 26W/841/ALTO.
      3) 5-5/8” length, 32 watts, 2400 lumens. Philips PL-T 32W/841/4P/ALTO.
      4) 6-3/8” length, 42 watts, 3200 lumens. Philips PL-T 42W/841/4P/ALTO.
      5) Refer to lighting fixture schedule for remaining bulb sizes and wattages.
   e. All other fluorescent lamps shall have a minimum CRI = 85 and color temperature of 4100ºK. Refer to lighting fixture schedule for remaining types and wattages.
2. Incandescent: G.E., Philips, Osram Sylvania, or accepted equal, general lighting line, inside frosted, 2500 hour average life, 130 volts unless noted otherwise.
3. LED: Lamps, with electronic drivers, as scheduled on the drawings.
4. H.I.D.: Lamps shall not exceed corrected color temperature of 4200E Kelvin. Metal halide lamps shall be provided with self-extinguishing devices to prevent operation of lamps when outer globe is broken, or operate in an approved enclosed fixture.
   a. Metal Halide: Philips, G.E., Osram Sylvania or Venture
   b. High Pressure Sodium: Philips (CRI = 65), G.E., Osram Sylvania

C. Ballasts [S] [O/M]:

1. Fluorescent:
   a. Ballasts for the following rapid-start lamps such as 36", 48" and 96" long T8 bulb, 96" long high output T8 bulb, the U-bent T8 bulb, and the 4-pin compact fluorescent lamps shall be an integrated circuit (IC) all electronic type and shall have the following specification:
      1) Shall **NOT** incorporate laminate core and coil components.
      2) U.L. listed, ETL certified, Class P and CSA certified.
      3) Sound levels shall not exceed Class A ambient noise levels. Limit to 2dB above a 16dB ambient (typical).
      4) Maintain constant light output with input variations of +/- 10%.
      5) Less than 10% Total Harmonic Distortion and 6% Third Harmonic Distortion on the nput current.
      6) Crest factor of 1.6 or less.
      7) Case temperature shall not exceed 25ºC rise over 40ºC ambient.
      8) Withstand input line transients as defined by ANSI/IEEE C62.41, Category A3.
      9) Internally fused for internal component failure.
      10) High power factor of .98 or greater.

11) High frequency operation of 25 Khz or greater with less than 2% visible lamp flicker.
12) Meet the requirements of the FCC Rules and Regulations, Part 18, Subpart C for RFI and EMI interference feedback into power systems.
13) Instant start ballast design is not acceptable for rapid start lamp applications except for low temperature (0º or less) ambient application. Rapid start ballast shall provide normal rated lamp life as stated by lamp manufacturers.
14) Ballast shall be as manufactured by Advance or Osram Sylvania.
15) A five (5) year warranty in-fixture replacement or labor reimbursement.
16) Other compact fluorescent ballasts shall be the all electronic type as manufactured by Advance or Osram Sylvania.

b. Unless otherwise noted in the fixture schedule on the drawings, ballasts for all T5 long fluorescent lamps shall be based on the Osram Sylvania PROStart T5 programmed rapid start series, or equal by Advance, having the following specifications:
1) (1) U.L. listed class P.
2) (2) Sound levels shall not exceed Class A ambient noise level.
3) Dynamic end-of-lamp life sensing.
4) High power factor (>98%).
5) Ballast factor of 1.0 or greater.
6) Starting temperature 0°F.
7) Lamp crest factor less than 1.6.
8) <10% THD.

c. Ballasts for all other fluorescent lamps including pre-heat trigger start lamps, compact fluorescent lamps and other lamps shall have the following specification unless otherwise indicated:
1) U.L. listed Class P.
2) Sound levels shall not exceed Class A ambient noise level.
3) CBM and ETL labeled.
4) High power factor or power factor corrected.
5) Encapsulated construction.

2. H.I.D. ballast shall be Advance, Universal Lighting Technologies, Osram Sylvania, Lithonia, or accepted equal, High Power Factor - 20ºF.
3. Emergency Ballasts:
a. Fluorescent emergency ballast shall be as manufactured by Bodine, catalog number B50ST or acceptable equal. The emergency ballast shall be capable of operating one (1) 17 watt to 215 watt (2' to 8') T8, T10, or T12 fluorescent lamp, one (1) 24 watt to 40 watt long compact fluorescent lamp, or two (2) (2' x 4') T8, T10, or T12 lamps for a minimum of 90 minutes in emergency mode. The ballast shall produce 1100 to 1200 lumens initial light output for standard lamps or 700 to 1000 lumens with a long compact fluorescent lamp. The ballast shall be self-testing by utilizing a 30 second test and diagnostic routine at least once every 30 days and indicate failures by a status indicator.

b. Fluorescent emergency ballast for 4' T5 and T5HO lamps shall be as manufactured by Bodine, catalog number B30ST or acceptable equal. The emergency ballast shall be capable of operating one (1) 28 watt T5 fluorescent lamp or one (1) 54 watt T5HO fluorescent lamp, for a minimum of 90 minutes in emergency mode. The ballast shall produce approximately 1850 lumens initial light output for 28 watt T5 lamps or approximately 2650 lumens with a 54 watt T5HO lamp. The ballast shall be self-testing by utilizing a 30 second test and diagnostic routine at least once every 30 days and indicate failures by a status indicator.

c. Fluorescent emergency ballast for 2' T5 and T5HO lamps shall be as manufactured by Bodine, catalog number LP600STU or acceptable equal. The emergency ballast shall be capable of operating one (1) 14 watt T5 fluorescent lamp or one (1) 24 watt T5HO fluorescent lamp, for a minimum of 90 minutes in emergency mode. The ballast shall produce approximately 750 lumens initial light output for 14 watt T5 lamps or approximately 725 lumens with a 24 watt T5HO lamp. The ballast shall be self-testing by utilizing a 30 second test and diagnostic routine at least once every 30 days and indicate failures by a status indicator.

d. Fluorescent emergency ballasts for 8' High Output (HO) or Very High Output (VHO) lamps shall be the same as specified above except to produce a minimum initial lumen value of 2900 for 8' type HO lamps and 3300 for 8' type VHO lamps. Ballast shall be Bodine, catalog number B30ST or acceptable equal.
e. Compact fluorescent emergency ballast shall be Bodine #413 for 5 thru 9 watt twin tube (2-pin) or #B84CG for 13 thru 42 watt twin, quad, or triple tube (4-pin) lamps.
f. The emergency ballast shall be U.L. listed for mounting inside or on top of the fixture and exceed NEC emergency standards [S][O/M].

4. Generator Lighting Transfer Device (G): Provide a generator (lighting) transfer device to work in conjunction with the emergency power generation system to power the selected (normal power) fluorescent lighting fixtures for egress lighting regardless of fixture wall switch position. The device shall consist of relay switching circuitry and fusing in a compact galvanized case. One (1) generator lighting device per fixture ballast to bypass the local wall switch (or time switch or contactor) allowing the building's emergency power to bring on normally powered switchable fixtures. The transfer device shall be suitable for damp locations. Bodine GTD Series or acceptable equal.
5. HID Backup Ballast (A): Provide an HID Backup Ballast to work in conjunction with the fixture's normal ballast and the emergency power generation system to hold the arc of the lamp from extinguishing during a power outage until the building generator comes on-line and emergency power is provided to the fixture. The ballast shall detect voltage sag, power interruption or failure and respond within two milliseconds. The ballast shall be capable of supplying power to the lamps for two minutes. It shall relinquish control only after AC power has been restored and deemed stable. The ballast shall use field-replaceable nickel-cadmium batteries which will fully recharge within 24 hours and shall be mounted remote. The ballast shall have a 5-minute delay on cold start to allow for natural warm up of the lamp. The ballast shall work with normal switching arrangements to operate only on a true loss of circuit or building power and not based on switch position. Bodine ArcKeeper Series or acceptable equal.

2.02 MATERIALS AND TYPE:

A. Exterior Post Lights [S] [O/M]:
1. The pole shall be complete with matching base cover, four (4) or more galvanized 50,000 PSI steel anchor bolts, two (2) galvanized 50,000 PSI nuts per bolt, two (2) galvanized washers per bolt.
2. The entire exterior post light assembly including the foundation shall be capable of withstanding 100 MPH winds with a 1.3 gust factor and an overall safety factor of 1.65.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Provide lighting fixtures complete with all required lamps, plates, rings, hangers, trim and all accessories necessary for a complete and secure installation. The number of lamps and lamp wattage is indicated as a prefix to the fixture type number. Contractor shall verify that the lighting fixtures' and ballasts' voltage conforms with the installation, the designated circuit voltage and the lighting fixture schedule.

B. All fixtures shall be adequately supported by fixture studs, conduit stems, steel rods or bar hangers. Fixtures shall not be mounted to or suspended from any mechanical system unless otherwise indicated.

C. Recessed fixtures in plaster ceiling areas shall be installed in rolled metal plaster frames provided by the Electrical Trade.

D. Before fixture order is placed, the Contractor will be responsible for checking type of ceiling in all spaces to determine if fixture type indicated is correct to fit ceiling encountered and if exposed fixture finish indicated is correct.

E. All recessed fluorescent light fixtures mounted in lay-in ceilings shall be fastened to the adjacent T-bars by Caddy #515 fasteners, or accepted equal. Support outlet boxes and fixtures from building structure independent of associated ceiling suspension system. Where a recessed 1' x 4', 2' x 2' or 2' x 4' lay-in fluorescent fixture is indicated, the Electrical Trade shall provide a minimum of two (2) auxiliary support wires at the diagonal corners of the recessed fixture. These auxiliary support wires shall be equal to or greater than the support wires for the ceiling system and capable of supporting the fixture if the ceiling system support wires were compromised. The auxiliary support wires shall attach **directly** to the fixture, at the fixture manufacturer's indicated locations. These wires shall be attached and supported from the structure in the same manner as the ceiling system support wires. Where support wires are attached to the structural steel above the ceiling system, utilize CADDY catalog number 4H24 flange clamps or equal at the point of attachment to the structural steel.

F. The installation of all air-handling troffers shall be coordinated with the Mechanical Trade who will install the duct portion. Troffers not utilized for air supply, shall have air supply slots function as return air openings directly to the plenum unless otherwise noted. Air slot closure strips shall be installed by the Mechanical Subcontractor where required.

OR

All recessed fluorescent troffers shall have air supply slots in the side trim and heat removal through the lamp cavity, complete with air slot closure strips and heat transfer dampers, to function as return air openings directly to the plenum, unless indicated otherwise. The air slot closure strips and heat removal dampers shall be installed by the Mechanical Trade where required. The above air functions shall require all the recessed fluorescent troffers, including the non-air function (static) recessed fluorescent troffers, to have a “floating door” appearance.

G. Lighting fixtures are shown in mechanical rooms for quantity and approximate location only. Coordinate exact location of all fixtures with Mechanical Trade. Some lighting fixtures will have to be mounted below ducts and pipes or on walls. Where possible, fixture to be approximately 8'-6" above floor to bottom.

H. The combined fixture body and enclosure for classroom use (library, labs, etc.) shall meet the V.C.P. (Visual Comfort Probability) Criteria of Texas’s Department of Education. Complete E.T.L., E.R.L., B.A.L.L., or I.T.L. photometric test data shall be submitted with the fixture shop drawing.

I. Where an emergency ballast is indicated, the charging circuit (unswitched lighting circuit) shall be connected on the local (circuit indicated on the drawings) unswitched lighting circuit controlling that fixture or fixture group. The emergency ballast output circuit shall be connected on the local switched circuit. The emergency ballast shall power a minimum of two (2) lamps in the same fixture to meet the Codes unless otherwise indicated.

J. All exterior post lighting fixtures shall be mounted on reinforced concrete foundation bases adequate for the site soil and weather conditions encountered. A detail generally illustrating the type and shape of the desired foundation is shown on the drawings and is issued for bidding purposes only. The Electrical Trade shall submit a similar detail of the foundation for their proposed lighting fixture and pole and shall obtain approval of the Architect's Structural Engineer. The post light foundation design factors shall include, but are not limited to, the following considerations:

1. Structural adequacy of concrete, with steel reinforcing as necessary.
2. Depth adequate to prevent frost heave.
3. Size large enough to encase anchor bolts with adequate thickness, preferably not less than 3 inches between the bolts and the soil.
4. Top surface of foundation shall be wide enough for the baseplate of the pole. Round foundations shall have the top surface diameter not less than 1-1/2 times the width of the pole base.
5. Larger foundations shall be used where adjacent trenching or other disturbances of the surrounding soil has occurred, where the soil quality is of poor strength characteristics, or if above-average winds are to be expected at the site.

6. Where required or indicated, provide "breakaway devices" that meet the Texas's Department of Transportation requirements, meet the latest AASHTO "Breakaway Criteria", are approved by FHWA and meets the standards and regulations of the Local Authority Having Jurisdiction.

K. Where a three- or four-lamp fixture is shown cross-hatched, the emergency circuit shall power the outside two (2) lamps without any local switch and the normal circuit shall control the inside remaining lamp(s) with the indicated local switch control (NEC 700-9).

L. All exit signs shall have the required individual or group flashing interface devices for connection to Section 28 31 00 Fire Detection and Alarm general alarm output for visual indicating appliances (per UFAS 4.28.3).

M. Low temperature (0ºF or less) solid state instant start ballast shall be used for all exterior and non-heated interior locations unless otherwise indicated.

END OF SECTION

SECTION 27 0000
GENERAL TECHNOLOGY REQUIREMENTS

PART 1 GENERAL

1.01 PROJECT SUMMARY

A. Scope: Successful bidder shall provide, install, configure, and provide warranty service for technology systems described herein.

1.02 RELATED DOCUMENTS

A. Documents: Provisions of General Conditions, Supplementary Conditions, and the sections included under Procurement & Contract Requirements are included as part of this section as though bound herein.

1.03 RELATED WORK

A. Section 27 0500 – Communications General Requirements
B. Section 27 0523 – Pathways for Technology Systems
C. Section 27 0526 – Grounding and Bonding for Technology Systems
D. Section 27 1100 – Communications Equipment Rooms
E. Section 27 1300 – Communications Backbone Cabling
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 3000 – Voice Communications
J. Section 27 4000 – AV/Multimedia General Requirements
K. Section 27 5100 – Distributed Communications Systems
L. Section 27 6000 – Physical Security General Requirements
M. Section 27 6200 – Electronic Access Control System
N. Section 27 6400 – Video Surveillance System
O. Section 27 6600 – Intrusion Detection System

1.04 DEFINITIONS

A. Approved or Approval: Where approval is called for, only persons with the authorized authority may grant approval. Owner reserves all rights to govern over and grant approval and will appoint authority of agents acting on their behalf.
B. As Required: Contractor shall provide the quantity of said item that is necessary. Owner and Consultant reserve the right to make the final determination of necessary quantities to provide for a complete system.
C. Basis of Design: The documentation of the concepts, calculations, decisions, and product selections used to meet the Owner's project requirements. These Consultant produced documents are not shop drawings. Product selections depict minimum functionality and overall quality and are open to substitution requests.
D. Consultant: True North Consulting Group.
E. Copyright: ©1984-2022 True North Consulting Group.
F. Contractor: The qualified party is responsible to provide all items and perform services as described within these documents. The Contractor referred to within a specific specification section shall be the successful qualified party contracted to perform and complete that work.
G. Documents: The complete package of Bid and Contract Requirements, General Technology Requirements, related Division 27 sections, drawings, schedules, and addenda that make up this Request for Bid.
H. End-User: Individual(s) who will ultimately operate the completed system.
I. ETR: Existing to Remain. Item is to remain in current location and maintain current functionality.

J. Furnish: To supply and deliver to project site, ready for installation.
K. Install: To place in a position of service or use.
L. NIC: Not in Contract. Item will be the responsibility of others.
M. Notice to Proceed: Formal communication from Owner to Contractor stating the date the Contractor can begin work subject to the conditions of the contract. The performance time of the contract starts from the Notice to Proceed date.
N. OFCI: Owner Furnished Contractor Installed. Item will be provided by Owner and shall be installed by Contractor.
O. OFE: Owner Furnished Equipment. Item will be provided and integrated by Owner.
P. OFOI: Owner Furnished Owner Installed. Item will be provided and installed by Owner.
Q. Owner: The party named in the Procurement and Contract Requirements as the advertising party.
R. Provide: To furnish and install, complete and ready for intended use.
S. Substantial Completion: The stage in the progress of installation when the systems described herein are sufficiently complete, in accordance with the Contract Documents, so that the Owner can utilize such systems for their complete intended use.
T. Turnkey: Of or involving the provision of a complete product or service that is ready for immediate use.
U. Work: The provision of products and/or services to meet the requirements specified in these documents.

1.05 REFERENCE STANDARDS AND CODES

A. Standards and other procedures referenced by this bid package are as follows:
1. ADA – Americans with Disabilities Act of 2010
www.ada.gov/2010ADAstandards_index.htm
2. AIA – American Institute of Architects
www.aia.org
3. ANSI – American National Standards Institute
www.ansi.org
4. ASTM – American Society of Testing and Materials
www.astm.org
5. BICSI – Building Industry Consulting Service International, Inc.
(RCDD Standards)
www.bicsi.org
6. CFR – Code of Federal Regulations
www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR
(Available from the Government Printing Office)
(Material is usually first published in the Federal Register)
7. U.S. Copyright Law, December 2011
www.copyright.gov/title17
8. ECIA – Electronic Components Industry Association
ESC – EIA Standards Council
www.eciaonline.org
9. IACS – International Annealed Copper Standard
www.ndt-ed.org/GeneralResources/IACS/IACS.htm
10. IEC – International Electrotechnical Commission
www.iec.ch
11. IEEE – Institute of Electrical and Electronics Engineers
standards.ieee.org
12. ISO – International Organization for Standardization
www.iso.org
13. ITU-T – International Telecommunication Union – Telecommunication
www.itu.int
14. NEC – National Electrical Code (NFPA 70)
maintained by NFPA – National Fire Protection Association
www.nfpa.org

15. NECA – National Electrical Contractors Association
    www.necanet.org
16. NEMA – National Electrical Manufactures' Association
    www.nema.org
17. OSHA – Occupational Safety and Health Administration
    (U.S. Department of Labor, OSHA)
    www.osha.gov
18. TIA – Telecommunications Industry Association
    www.tiaonline.org/standards
19. UL – Underwriters' Laboratories
    www.ul.com

B. Standards: Referenced standards and/or procedures shall be binding on the Contractor and work shall be judged against such standards and procedures unless otherwise stated in writing.
C. Local/State Codes: Contractor shall comply with all local and state code requirements as determined by the authority having jurisdiction (AHJ).
D. Owner Standards: Contractor shall obtain and abide by all published Owner standards as they pertain to the work described herein.
E. Contractor shall use the latest versions of all standards and codes unless otherwise directed by the authority having jurisdiction (AHJ) or expressly noted herein.

1.06 QUALIFICATIONS

A. Refer to related sections for specific requirements.

1.07 PERMITS AND INSPECTIONS

A. Responsibility: Obtain permits and inspections required for the work. Contractor is responsible for all permit and inspection costs.
B. Performance: Perform tests required herein, or as may be reasonably required to demonstrate conformance with the specifications or with the requirements of any legal authority having jurisdiction.
C. Review: Obtain approval from authorities responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with all requirements of reference codes indicated herein and required by the appropriate jurisdiction. Make corrections, changes or additions as required and deliver certificates of acceptance, operation, and/or compliance with the Operation and Maintenance Manuals described herein.

1.08 DRAWINGS AND BASIS OF DESIGN

A. General: Work, equipment, or material delineated on any drawing in this package is expected to be provided by Contractor unless noted otherwise.
B. Interpretation: Work shall be installed in accordance with the basis of design diagrammatically expressed on the drawings and described in the written specifications and equipment schedule(s). Contractor shall not make limiting interpretation that provides for incomplete work or a non-functioning system.

1.09 PRODUCT SUBSTITUTION PROCEDURES

A. Requests for Substitutions: Should the Contractor request a change in the material that is to be supplied, from that which was specified in the contract, the Contractor shall provide the Owner and the Consultant with a written request for said change.
B. Substitutions for Non-specified Products: Where no product specification is provided, Contractor may use manufacturer's specification for the identified product as a guide for suggesting appropriate substitutions.
C. Requirements: The Request for Substitution shall include:
    1. Reason for substitution.
    2. Material data sheets for both the proposed item(s) and the item(s) to be replaced.
    3. Any cost impact to the Owner.

D. Changes: Proposed changes to Contract Documents shall be clearly identified in the pre-construction submittals.
E. Approval: The Owner may approve or deny any Requests for Substitution. The Owner reserves the right to govern over and proclaim whether proposed products are equal to the specifications. The Contractor shall not procure any substitute materials until the Owner has approved and signed the Request for Substitution and passed copies to the Contractor and the Consultant. Any procurement or work performed prior to this approval is at the Contractor's own risk.
F. Deviation: Products provided or installed that deviate from the products specified in make, model, color, or other significant characteristic (i.e., non-approved substitutions) shall be removed and replaced with specified products at no additional expense to Owner.

1.10 SOFTWARE

A. Versions: Consultant used the following software versions for this project:
   1. Autodesk Revit 2019 (floor plans)
   2. Autodesk AutoCAD 2018 (detail sheets)

1.11 SUBMITTAL CONDITIONS

A. The Contractor shall not consider the Consultant or Owner's review of submittals to be exhaustive or complete in every detail. Approval of shop drawings or submittals including substitutions, indicates only the acceptance of the Contractor's apparent intent to comply with general design or method of construction and quality as specified. The finished product shall meet functional requirements, operations, arrangements, and quantities and comply with the contract documents unless specifically approved otherwise.
B. The Contractor shall be held responsible for delivery of systems as specified. Any errors or omissions in the submittals shall not relieve Contractor of responsibility to deliver complete systems as specified.

1.12 PRE-CONSTRUCTION PROCEDURES

A. Pre-Construction Submittal Meeting: Contractor shall schedule web conference (WebEx or similar) with Consultant to review basis of design and submittal expectations.
B. Prior to Work: Pre-construction submittals shall be provided to Consultant with appropriate promptness as to cause no delay to the work.
C. Project Timeline: Project timeline will not be altered due to lateness of submittals. Contractor is bound to deliver a timely, complete, and finished project as stipulated in their contract and specified herein.
D. Format and Distribution: Contractor shall provide one (1) electronic copy in PDF format to Consultant of all pre-construction submittals. The Contractor shall provide hard copies sets as required up to five (5) sets.
E. Provision: Contractor shall submit pre-construction submittals including any corrections or additions to Consultant prior to the procurement of equipment or commencement of work.
F. Review: Pre-construction submittals shall be received and formally approved by Consultant prior to the procurement of material or the commencement of work. Any procurement or work performed prior to this approval is at Contractor's own risk.
G. Failure to Provide: The failure of Contractor to provide pre-construction submittals as required herein may result in the withholding of payment for work and/or the cancellation of the contract.

1.13 PRE-CONSTRUCTION SUBMITTALS

A. Pre-construction submittals are intended to document the details of installation. Exact copies of original drawings and specifications are not acceptable as pre-construction submittal drawings. Consultant schematic diagrams describe the basis of design as defined herein.

B. Contractor shall provide to Consultant the following pre-construction submittals for approval in addition to specific requirements identified in subsequent sections.
    1. Qualifications: Shall include documentation of all required qualifications.
    2. Shop Drawings:
        a. Title: Each drawing shall have a descriptive title, and all subparts of each drawing shall have unique identifiers.
        b. Floor Plans: Shall include device locations, Contractor provided furniture and installation notes.
        c. System Drawings: Shall include functional diagrams for each system detailing system flow including all equipment, routing, inputs/outputs, wiring signal type, cable identification detail, connectors, adapters, intra/inter-rack power distribution, installation notes and any other information required to convey the complete turnkey system design.
        d. Equipment Rack and Cabinet Elevations: Shall include placement of all mounted equipment.
        e. Structurally Mounted Elements: Shall include both plan view of placement as well as a detail of structural mounting techniques to be used.
        f. Furniture: Shall include all Contractor provided furniture showing dimensional drawings, cable management and finishes with samples for Owner approval.
    3. Product Data:
        a. Equipment Schedules: Shall include manufacturers, part numbers, quantities and unit pricing.
        b. Product Cut Sheets: Shall identify (highlight, arrow, etc.) actual part numbers to be utilized including but not limited to equipment, mounting hardware, cabling, connectors, software and power distribution equipment.
    4. Manufacturers' Recommendations:
        a. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, copies of these recommendations shall be provided prior to installation. Installation of the items will not be allowed to proceed until the recommendations are received and approved.

1.14 PRE-INSTALLATION PROCEDURES

A. Refer to individual sections for additional information.

1.15 CONSTRUCTION PROGRESS PROCEDURES

A. Meeting Attendance: Contractor is required to attend job progress meetings in accordance with requirements set by Owner or Consultant.
B. Additional Coordination: Contractor shall request additional job construction coordination meetings it deems to be necessary to ensure coordination of their responsibilities with other parties.
C. Progress Inspection: Consultant may perform periodic progress inspections. At Consultant's request, Contractor shall make Project Manager and/or Lead Technician available.
D. Test Plan: Ten (10) business days prior to the proposed Contractor test date, Contractor shall provide a test plan defining the tests required.
    1. The test plan shall be approved by Consultant prior to any testing.

1.16 CONSTRUCTION PROGRESS SUBMITTALS

A. Completion: Contractor shall complete and submit via email all construction progress documentation in PDF format as requested by Owner and Consultant.
B. Contractor shall provide to Consultant the following construction progress submittals in addition to specific requirements identified in subsequent sections.
    1. Weekly Report: Weekly written report to be submitted to Consultant through appropriate project channels in PDF format outlining progress from previous week,

plans for progress in the current week, and any coordination issues that may require Consultant or Owner attention.

2. Test Plan: Shall ensure the system meets Owner operational and performance specifications and include the following:
   a. Identification of the capabilities and functions to be tested.
   b. Detailed instructions for the setup and execution of each test.
   c. Procedures for evaluation and documentation of the results.

C. Failure to Complete: Failure to complete requested construction progress documentation may result in the withholding of payment by Owner.

1.17 CLOSEOUT PROCEDURES

A. Notification: Contractor shall provide written notification to Consultant and Owner when Contractor is satisfied that the work has reached Substantial Completion and is ready for inspection.

B. Pre-Inspection Submittals: Contractor shall submit an electronic copy of all closeout submittals to Consultant in accordance with the requirements found in these documents no less than ten (10) business days prior to the scheduled Final Inspection.

1. Test Results
2. As-built drawings (full-size sheets)
3. Operation and Maintenance Manuals
4. End User Software
5. Photos that demonstrate complete system installation.

C. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in these documents, and/or unacceptable to Consultant or Owner shall be documented by Consultant and provided to Contractor to rectify at no additional cost. Contractor shall provide written notification to Consultant and Owner when all punch list items have been completed.

D. Final Inspection: At Consultant's request, Contractor shall make Project Manager and/or Lead Technician available.

E. Re-Inspection: If more than one (1) re-inspection is necessary, the costs of the additional travel, time, and expenses of Owner and Consultant may be deducted by Owner from the contract amount due to the Contractor.

F. Punch List Approval: Once all punch list items are complete, the Contractor shall return an initialed punch list to the Consultant and Owner for verification. Punch list shall be considered complete only after having been signed by Owner and Consultant.

G. Closeout Submittals: Upon approval of closeout submittals and prior to final acceptance, Contractor shall provide three (3) electronic copies to Owner and Consultant in format(s) noted below.

1. Record Drawings – AutoCAD 2018 editable .dwg format AND PDF.
2. Operation and Maintenance Manuals – Digital format
3. End User Software – digital format.
4. Documentation of testing and system certification.

H. Closeout Submittal Format and Distribution: Upon approval of closeout submittals and prior to final acceptance, Contractor shall provide a total of three (3) bound hard copies and one (1) digital copy with labeled dividers of all record drawings (full-size sheets) and operation and maintenance manuals, three (3) copies to Owner and one (1) digital copy to Consultant. Title on front and spine of binder shall be "Operation and Maintenance Manual – [Project Name]". The following additional items shall be identified on the binder cover:

1. Client Name
2. Contractor Name and Contact Information
3. Consultant Name and Contact Information
4. Date

I. All documentation prepared by the Contractor, including hard copy and electronic forms, shall become the property of the Owner.
J. Payment Authorization: Final payment will be authorized only after all closeout procedures and requirements have been followed and fulfilled by Contractor and approved in writing by Owner and Consultant, including punch list(s) and/or re-inspection(s) and delivery of closeout deliverables.

1.18 CLOSEOUT SUBMITTALS

A. Closeout submittals are intended to document the details of the final installation that substantially conforms to the construction documents and functions as intended to meet the Owner's needs.
B. Contractor shall provide to Consultant the following closeout submittals for approval in addition to specific requirements identified in subsequent sections.
    1. As-built drawings: As-built drawings are prepared by the Contractor. They show, in red ink, on-site changes to the Consultant-approved pre-construction submittal documents. As-built drawings shall be submitted to Consultant for approval prior to submitting record drawings and include:
        a. Changes made by Addenda, Change Orders, Requests for Information (RFIs), Architect's Supplemental Instruction (ASIs), or Requests for Proposal (RFPs) in addition to any other changes to the original documents.
        b. Actual device locations, conduit routing, wiring and relationships as they were constructed.
        c. Nomenclature showing as-built wire designations and colors.
        d. Room numbers coinciding with Owner space planning numbering.
    2. Record drawings: Record drawings are the final drawings prepared by the Contractor and incorporate all as-built drawing changes previously approved by Consultant. Record drawings should be electronically produced without any handwritten, red ink, or clouded changes.
    3. Operation and Maintenance Manuals: Notwithstanding requirements specified elsewhere, submit one (1) copy of each of the following per binder:
        a. A final Bill of Materials for each system.
        b. A Microsoft Excel (.xlsx format) spreadsheet for each device that resides on the network, provide the following:
            1) IP Address
            2) MAC Address
            3) Serial Number
            4) Manufacturer
            5) Model Number
            6) Device Username
            7) Device Password
            8) Telecom Closet or Rack Location
            9) Patch Panel Port Number
            10) Switch Port Number
            11) Any other relevant information as requested by Owner
        c. Manufacturers Instruction Manuals: Specification sheets, operation manuals and service sheets published by the manufacturers of the components, devices and equipment provided.
        d. Information for testing, repair, troubleshooting, assembly, disassembly, and recommended maintenance intervals.
        e. Replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purposes.
        f. Performance, Test, and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.
        g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturers' Warranty Registration papers as described herein.

h. Sufficient information, (detailed schematics of subsystems, assemblies, and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.
i. Any other items defined herein.

4. Local Reference Diagrams: Within each equipment rack, enclosure, or cabinet, the Contractor shall place a functional diagram of the system(s) in a clear plastic sleeve secured to the equipment rack, cabinet, or enclosure.
5. Intellectual Property: Provide all required items and written release as described herein.
6. Training Program: Proposed training materials and program outline.
7. Spare Parts and Remote Controls: Contractor shall submit record of Owner sign-off of turnover of spare parts and remote controls.

1.19 PROJECT MANAGEMENT

A. Project Manager: Contractor shall appoint a Project Manager who will be the main point of contact for Owner and Consultant regarding the project.
B. Responsibility: Project Manager is responsible for the following:
   1. Successfully completing the contract in a timely manner.
   2. Overseeing work and performance of all employees and Subcontractors who have been hired by Contractor and ensuring compliance with specification.
   3. Completing and submitting required documentation.
   4. Attending project coordination meetings as required by Owner, Consultant, and Contractor. Contractor is responsible for taking minutes of these meetings and distributing copies to all participants in a timely manner.
   5. Coordinating with Owner, Consultant, Architect, General Contractor, and other Contractors involved in the project to ensure smooth flow of work and on-time project completion.
   6. Providing a written weekly progress update to the Owner and Consultant in a PDF format emailed to the project team.
   7. Reporting all unexpected conditions and problems that may result in delay or expense to Owner and Consultant immediately upon discovery.
C. Change of Project Manager: If Contractor seeks to change Project Manager during the course of the Project, such change is subject to prior written approval from Owner.
D. The Owner reserves the right to request a change of project manager at any time for any reason.

1.20 EXAMINATION OF EXISTING CONDITIONS

A. Examination: Contractor shall examine the facility and construction documents to the extent necessary to plan for efficient installation strategies prior to the delivery of materials to the site or the commencement of work. Other documents (Architectural Drawings, hardware schedules…) may be made available upon request. Failure to adequately complete the examination shall not result in change order requests.
B. Acceptance of Conditions: Commencement of work by Contractor shall indicate acceptance of existing conditions, unless a written notice of exceptions has been provided to Owner prior to commencement.
C. Observation: If Contractor observes—during preliminary examinations or subsequent work—existing violations of fire stopping, electrical wiring, grounding, or other safety- or code-related issues, Contractor shall report these to Owner in a timely manner.
D. Pre-Existing Damage: If Contractor observes damage to finished surfaces before they begin installation in any area, Contractor shall document by taking digital photos of the damaged area(s) and immediately notify Construction Manager and Consultant via email with attached photos.
E. Damage during Installation: Any damage caused by or reasonably believed by the Construction Manager to be caused by the Contractor shall result in back-charges for said damages. Repairs shall match preexisting color and finish of walls, floors, and

ceilings. Any Contractor damaged ceiling tiles, floor, and carpet shall be replaced to match color, size, style, and texture.

1.21 CONTRACT MODIFICATION PROCEDURES

A. Changes: Changes to the contract may be initiated by Owner, Consultant or Contractor.
B. Request for Information (RFI): If a change originates with Contractor, the Contractor shall submit an RFI for Consultant review. If it is deemed a change is necessary, the Consultant shall issue a PR to address the change.
C. Proposal Request (PR): If a change originates with Owner or Consultant, Consultant shall issue a Proposal Request to Contractor.
D. Change Proposal (CP): If a change originates with Contractor, or if Contractor receives a Proposal Request from Consultant, Contractor shall submit a Change Proposal to Consultant to review.
    1. References: A Change Proposal shall reference the work to be performed and shall include the cost change to the Project (if any) and the time change to the scheduled completion (if any).
    2. Additional Information: Consultant may request additional information to be supplied with the Change Proposal for consideration.
    3. Acceptance: Owner reserves the right to accept or reject Change Proposals.
E. Change Order: A Change Order is a modification of the contract.
    1. If a Change Proposal is approved, Owner will issue a Change Order that references PR and/or CP. Change Order is not valid until it has been signed by Owner.
    2. Work performed or equipment supplied outside of contract without a valid Change Order is done at Contractor's own risk.

1.22 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Storage: Contractor shall provide secure material storage. If Contractor chooses to store cabling or equipment at project site, that Contractor shall receive written approval from GC or Owner to identify acceptable location. All equipment provided by the Contractor remains the responsibility of that Contractor until Owner has beneficial use of the equipment.
B. Protection: Contractor shall take all necessary precautions to protect materials from the following:
    1. Theft
    2. Vandalism/Tampering
    3. Dents
    4. Scratches
    5. Dust
    6. Temperature
    7. Weather
    8. Cutting
    9. Paint
    10. Other hazardous conditions
C. Replacement: Contractor shall replace any damaged or lost material as required by Owner or Consultant.
D. Installed Materials: Installed materials remain the responsibility of the Contractor until Acceptance. Contractor shall take necessary precautions to ensure the safety and security of installed materials.

1.23 INTERFERENCE WITH THE FACILITY

A. Transportation and storage of materials at the facility, work involving the facility, and other matters affecting the habitual use by the Owner of the Owner's buildings, shall be conducted to minimize interference, and at times and in a manner acceptable to the Owner.

1.24 ON-SITE CONDUCT

A. Conduct: Any demonstration of rudeness, use of profanity, or lack of respect by Contractor Personnel to a building tenant will be cause for immediate removal from the premises, and such Personnel will not be allowed to return. Contractor and Contractor's Personnel are to remain in project area.
B. Vandalism: Graffiti or vandalism will not be tolerated. Any Contractor/Personnel caught in the act shall be immediately removed from the premises and will not be allowed to return.
C. Hazardous Conditions: No one shall be allowed to endanger the building, its premises, or its occupants in any manner whatsoever. In the event that a situation occurs which threatens the building or its occupants in any manner, Contractor, Contractor Personnel, Subcontractor, etc. shall take immediate steps to correct the hazardous condition. In the event that Contractor's Personnel fail to correct hazardous condition, Owner reserves the right to immediately take steps to correct the situation at Contractor's expense.

1.25 SAFEGUARDS AND PROTECTION

A. Barriers: Provide and maintain suitable barriers, guards, fences and signs where necessary to accommodate the safety of others relative to and/or for the protection of this work.
B. Regulations: Comply with OSHA, Federal, State, Local, and Owner regulations and standards pursuant to this work.
C. Protection: Protect all materials and equipment to prevent the entry or adhesion of any and all foreign material. If necessary, cover equipment with temporary protective material suitable for this purpose.
D. Finishing: Check, clean and remove defects, scratches, fingerprints and smudges if necessary from all equipment and devices immediately prior to Acceptance of the Installation.
E. Damage: Replace all damaged or defective material or work at no additional cost prior to Final Acceptance.
F. Documentation: Provide written description of accidents by workers, staff, and general public of any incident occurring on the project. Report incident in writing to Owner's representative immediately and to the Project Manager for follow up.

1.26 OWNER-FURNISHED PRODUCTS

A. Delivery: Owner is responsible for delivery of Owner-furnished products to the project site, unless otherwise specified in this document.
B. Placement: Contractor is responsible for locating, inspecting, and moving Owner-furnished products to their final installation position.
C. Inspection: Contractor shall report any damage, discrepancies in quantity, type, or function to Owner and Consultant immediately upon discovery.
D. Warranty: Contractor assumes no responsibility for any material warranty for Owner-furnished products. Contractor shall be responsible for integrating, cabling, and installing Owner-furnished products under the same warranty conditions as other products furnished by Contractor.

1.27 QUALITY ASSURANCE

A. Assurance: It is the intent of these specifications to describe and provide for a complete, professional, and reliable installation.
B. Qualifications: Contractor employees who are engaged in installation shall be properly trained in the tasks they are expected to perform.
C. Acceptability: Owner shall determine the acceptability of work.
D. Regulatory Requirements: Contractor shall comply with code requirements that apply to the work being performed.

E. Certifications: Where manufacturer certifications are required for warranty or for authorized resale, installation personnel shall have received such certification prior to the start of installation of those manufacturers' materials.

1.28 QUALITY CONTROL

A. Installation: During installation period, when connections are made to the Owner's existing infrastructure, Contractor shall use care to ensure that such connections will not have a negative impact which could reduce or hamper existing systems.

1.29 OWNER'S RIGHT TO USE EQUIPMENT

A. The Owner reserves the right to use equipment, material and services provided as part of this work prior to Acceptance of the Work, without incurring additional charges and without commencement of the Warranty period.

1.30 INTELLECTUAL PROPERTY OWNERSHIP

A. All intellectual property shall remain in escrow for an unlimited period of time. All supporting documentation including but not limited to: software, firmware, programming, uncompiled source code, graphic files, diagrams, written and electronic files, including all latest versions of the documentation and software necessary to edit and adapt the system(s), shall be provided to the Owner in digital format for all spaces and all systems. The integrator and/or programmer shall also maintain a current live copy incorporating all system modifications to be provided at the Owner's request and for system restoration upon a failure.
B. A written release shall be given by the Contractor and all other required parties for all programming and configuration done by the Contractor and/or Subcontractors. This release will acknowledge the Owner's ownership and right to modify the intellectual property directly, or to have the intellectual property modified by any party of the Owner's choosing.

PART 2 PRODUCTS

2.01 BASIC EQUIPMENT AND MATERIALS REQUIREMENTS

A. Standards: Equipment and materials used to accomplish the goals of this project shall meet standards for good engineering practice as defined within this document.
B. Quality: Products specified in these documents are intended to establish a baseline or operational, functional, and performance-based standards that all proposed products shall meet or exceed by functionality and quality.

2.02 FACTORY-ASSEMBLED PRODUCTS

A. Manufacturer: Reference to specific equipment manufacturers does not imply that all products produced by that manufacturer meet the specification requirements.
B. Age of Equipment: Equipment shall be new and unused with full manufacturer's warranties. Contractor shall supplement such warranties as required by the specification. Contractor shall immediately notify Consultant of any product that will be or is expected to be discontinued by the end of the project for resolution.
C. No Modification: Where a product is available from a factory/manufacturer to meet the needs as outlined, that product shall be used without modification to ensure the full factory warranty is maintained.
D. Like Materials: Like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.
E. Software/Firmware: No software or firmware is to be used unless specifically authorized by Owner or its appointed representative.

2.03 RACKS, CABINETS, HARDWARE

A. Equipment Racks and Cabinets: Provide racks and cabinets as specified herein and/or described in accompanying documents, appendices, or drawings. Verify that any

existing racks and/or cabinets provided by others are complete, bringing any discrepancies to the attention of Owner and Consultant prior to beginning the installation.

B. Shelves and Mounts: Contractor shall supply necessary mounting hardware to install rack-mounted equipment. Mounting hardware shall be a product of the manufacturer of the equipment to be mounted, or manufacturer of the rack system, or approved by either for use with their product. Provide supporting channels, shelves, rack mounts, and/or rack ears as recommended by equipment manufacturers.

C. Screws and Washers: Contractor shall provide screw head types appropriate to the level of security required for the equipment and racking. Screws shall include polyethylene or nylon washer.

1. Public Access Areas: Star post or square post security screws shall be used for hardware and equipment mounted in equipment racks and consoles in areas that are accessible to the public.
2. Restricted Access Areas: Philips head screws may be used where a secure room entrance or locked rack/console door prevents public access.

2.04 POWER DEVICES

A. Power Strips: Unless otherwise specified, power strips shall be UL listed, surface mounted, and rated for 20 amp continuous electronic loads. Outlets shall be 125 volt, 20 amp, three-wire, grounded, and NEMA 5-20R compliant. Cords shall be 12/3 SJT with molded plug.

B. Power Distribution Panels: Unless otherwise specified, power distribution panels shall be UL listed, rack mounted, rated for 20 amp continuous electronic loads, with switch and pilot light. Up to eight outlets shall be mounted to the back, each rated 125 volt, 20 amp, three-wire, grounded, and NEMA 5-20R compliant. Switch and pilot shall be mounted to the front. Cords shall be 12/3 SJT with molded plug.

C. Contractor shall provide acceptable power distribution units as required in order to provide sufficient outlet connectivity for Contractor-furnished and Owner-furnished equipment indicated on drawings and equipment schedules, plus up to 15% additional capacity for future growth. This may be in addition to any power distribution equipment indicated on equipment schedules.

2.05 CABLE AND CONNECTORS

A. Cable: Cable shall be selected and applied in a manner defined by signal type, consistent with best industry practices. Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Where required by the NEC, substitutions of air handing plenum cable shall exactly match the normally applied product and shall meet the standards of UL Standard #900 and the NEC Articles 800 and 820.

B. Connectors: Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Strain reliefs and cable clamps shall be sized for the connector and the cable.

C. Color: Cable and connector color shall be coordinated with Consultant to maintain consistency with cable and connector color schemes used by other trades.

2.06 CABLE MANAGEMENT

A. Plastic Cable Ties: Single use white nylon plastic cable ties, appropriate screw fittings, or mounting clips may be used for AC power cable management within racks and enclosures. Plastic/nylon cable ties shall not be used for signal and DC cables.

B. Velcro Cable Ties: Velcro straps shall be used for all signal and DC cables. Velcro straps shall be black, with no logo or decoration, except as authorized by Consultant.

2.07 ANCILLARY HARDWARE

A. General: Contractor shall provide ancillary and required accessory items necessary to provide a complete and fully functional system to Owner.
B. Interpretation: Exclusion of or limitation in the language used in the drawings or specifications shall not be interpreted as meaning that ancillary or accessory items of work or equipment necessary to complete or make the installed system fully functional can be omitted.

2.08 GROUNDING HARDWARE

A. Refer to Section 27 05 26 for specific Grounding and Bonding requirements.
B. Provide data/telecommunication grounding systems indicated in the project drawings and specifications. Products shall include, but are not limited to, cables/wires, connectors, terminals, compression lugs, grounding rods/electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE, ANSI/TIA and established industry standards for applications indicated.

2.09 FIRE STOPPING MATERIALS

A. All penetrations of walls shall be approved by the General Contractor before any penetrations are made. Should the Contractor find it necessary to penetrate any walls extending to the slab, it will be the responsibility of that Contractor to provide satisfactory sleeving and fire caulking both inside and outside of that sleeving. If existing sleeving is to be utilized, it will be the responsibility of the Contractor to fire caulk inside the sleeving.
B. The Contractor is responsible for adhering to the following standards:
    1. Conduit penetrations through fire-rated or smoke walls: Completely seal around the conduit penetration with Hilti FS 601 fire-rated sealant or equivalent by Tremco, 3M, or equal.
    2. Conduit sleeves through fire-rated or smoke wall: Completely seal around the conduit penetration with Hilti FS 601fire-rated sealant or equivalent by Tremco, 3M, or equal. Completely seal inner opening of the conduit sleeve with fire wool packing and Hilti FS 611A intumescent firestop sealant.
    3. Cable bundles through fire-rated or smoke walls (without sleeves): Completely seal openings with Hilti FS 611A intumescent firestop sealant or equivalent by Tremco, 3M, or equal.
    4. Cable tray penetrations through fire-rated or smoke walls: Completely seal openings with Hilti FS 635 (trowelable type), or equivalent by Tremco, 3M, or equal.
C. A submitted response to this specification assumes that all firestopping will be provided as specified. The firestop manufacturer’s specifications and instructions shall be submitted with the final documentation.

2.10 COMPATIBILITY OF RELATED EQUIPMENT

A. Existing Equipment: Equipment and systems specified in these documents shall be assumed to be compatible with the systems already installed at Owner site(s) and as identified in this document as related to this project.
B. Installed Equipment: Specified equipment and systems shall be compatible with all other equipment and systems as offered by Contractor, thus placing the responsibility on Contractor to ensure proper interaction.

2.11 LICENSES

A. Any and all licenses required for system functionality shall be provided.

2.12 SPARE PARTS

A. Suggested List: Contractor is requested to submit a list of suggested spare parts with an offered price, allowing Owner to select appropriate parts.

B. Means of Obtainment: Contractor shall state where spare parts can be obtained after the installation.

2.13 MAINTENANCE MANUALS

A. Contractor shall produce a maintenance manual showing interconnection of equipment and any special procedures necessary for proper operation and maintenance of the systems.

PART 3 EXECUTION

3.01 GENERAL

A. Contractor shall provide, furnish, deliver, transport, erect, install, connect and configure all of the material and equipment described herein or depicted on any bid package document or drawing, as required for a turnkey solution.

3.02 COORDINATION

A. General: Contractor shall cooperate with other Contractors for proper provisioning, anchorage, placement, and execution of all work. Interference between the work of various Contractors shall be resolved before installation. In the event of conflict on space requirements or location of devices, refer the matter to Owner and Consultant for decision.

B. Related Work: References to the following related work do not limit or release Contractor from the responsibility of coordination with other trades or from having the necessary knowledge of other non-referenced work.

1. Work by General Contractor.
2. Work by other Technology Contractors.
3. Work by Electrical Contractor, including electrical rough-ins and surface-mounted raceway.

C. Delays: Contractor shall coordinate with all other trades to avoid causing delays in the installation schedule.

D. AC Power: Contractor shall coordinate with General Contractor its requirements for proper AC power to service all equipment installed by Contractor.

E. Low Voltage Sleeving: Contractor shall provide openings through walls as necessary, with sleeving and fire-stopping materials installed in a professional manner to meet local and national codes.

F. Grounding and Bonding: Contractor shall coordinate with General Contractor its requirements for proper grounding and bonding to their equipment.

G. Surface-Mounted Raceway Coordination

1. General and Electrical Contractors: Contractor shall coordinate with General Contractor and Electrical Contractor the installation of surface-mounted-raceway where not provided but made necessary by non-penetrable wall.
2. Verification: Contractor shall field verify and coordinate the proposed use of surface-mounted raceway at any location with Consultant and Owner.

3.03 BASIC EXECUTION REQUIREMENTS

A. General: Contractor is responsible for following industry standards of good practice for telecommunications and networking equipment.

B. Aesthetic Factors: With the installation of equipment and cables, consideration shall be given not only to operational efficiency but also to overall aesthetic factors. Contractor shall redo, at no cost to Owner, any work deemed by Owner to appear sloppy, hastily done, or unprofessional. Owner shall make final decision over whether work shall be redone.

C. Manufacturers' Recommendations: Manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the

manufacturers or as indicated in their published literature unless otherwise noted herein.

D. Protection of Work Area: Work shall be properly protected during construction; including shielding soft or fragile materials, protecting against dust and dirt, protecting and supporting cable ends off of the floor and from other traffic, protecting floor box lids, and temporarily plugging open conduits during construction. Upon completion, installation shall be thoroughly cleaned and all tools, equipment, obstructions, or debris present as a result of work shall be removed from the premises.

E. Protection of Cable and Equipment: Contractor shall make appropriate preparations to protect all cabling and equipment from foreign material. Foreign material is defined as any substance or material that would void the manufacturer's performance warranty, impact ratings (UL, Plenum, etc.), or cover up markings needed for inspection. Foreign material includes, but is not limited to, paint overspray (intentional or not), fire-stopping material, drywall compound, or any other chemical, liquid, or compound that could come in contact with cables, cable jackets, cable termination points, or other equipment.

   1. Cleaning of cables or equipment with harsh chemicals is unacceptable. Contractor shall replace any affected cable, cable components, or equipment in its entirety at no cost to the Owner.

F. Waste Materials: Contractor shall keep work area neat, orderly, and free from accumulation of waste materials. Remove trash and debris from the building and job site as required to maintain a clean work environment at all times. Rubbish shall be moved to a common trash point or receptacle on the job site as determined and directed by General Contractor or Owner.

G. Dumpsters: No construction debris shall be placed in building's dumpsters. Contractor shall provide a dumpster for construction waste and debris at own expense. Said dumpster shall be emptied on a regular schedule. Location of dumpster shall be arranged through Building Management. Appropriate measures shall be taken to protect asphalt or other ground surfaces.

H. Ceiling Grid: Contractor shall not hang cable supports from ceiling grid wire.

I. Roof Deck: Contractor shall not shoot into the roof deck for mounting cable hangers.

J. Mounting: Equipment and enclosures shall be mounted plumb and square in relation to the structure.

K. Raised Floor: All cabling installed below the raised floor shall be placed in the provided cable trays with appropriate means to hold cable in place. If no cable tray exists, Contractor shall provide J-hooks to hold cables in place. Sleeves shall be utilized for cable egress.

L. Motorized Furniture: Care shall be taken to properly dress all cables placed within motorized furniture and provide sufficient cable length and strain relief to allow motorized elements to operate within their full range of travel.

M. Flexible Furniture: Care shall be taken to properly dress all cables placed within flexible or re-configurable furniture to provide sufficient cable length and strain relief to allow full range of travel for flexible furniture configurations.

3.04 PREPARATION

A. Existing Equipment: Prior to any installation, the Contractor shall prepare the site by removing any remaining debris, leveling equipment racks (where appropriate), and verifying information and systems stated to be in-place are ready for use.

B. Equipment for Installation: Prior to installation, Contractor shall ensure that required major equipment has been secured and is ready for installation.

3.05 CLEANING

A. Tool Clean-up: Contractor is not permitted to use restrooms for tool clean-up. A slop-sink may be provided in janitorial closet on each floor for cleaning of tools and equipment and as a source of water. Janitorial closet or maintenance area or shop shall

be kept clean at all times. Contractor or Contractor's Personnel found using restrooms for clean-up or other similar purposes shall be subject to removal from building.

B. Daily: At the end of each work period or day, Contractor shall remove excess packing, drilling remnants, and other non-equipment related parts, materials, or debris to ensure a clean, safe, and professional working environment.
C. Carpet: Contractor shall ensure that no damage to carpeting occurs as a result of their work. Contractor shall cover carpets in areas of work to prevent wire and other debris from entering the carpet.

3.06 DEMOLITION

A. General: The Contractor shall be responsible for removal, collection, transportation, and recycling of all cabling and components that become abandoned as a result of this project. This shall include the delivery of cable and components to the proper recycling centers. If material is to remain on site for more than seven days after removal, Contractor shall coordinate with Owner for an acceptable storage location.
B. Verification: Contractor shall field-verify existing conditions prior to beginning demolition work. Any discrepancies shall be reported to the Consultant prior to the start of work in order to prevent disturbance of existing installation(s). Beginning work shall indicate acceptance of existing conditions. Contractor is responsible for immediately restoring any outages caused as a result of removing or damaging adjacent cabling, systems, or services.
C. Abandoned Cable: The Contractor shall remove all abandoned cable back to the headend. Where it is not possible to remove cables without damaging other cables that are to remain, such as in a shared conduit, the Contractor shall report these conditions to the Consultant for approval. These cables shall be cut at entry and exit points, leaving a minimum of 24" of cable at each end.
D. Cover Plates: The Contractor shall provide and install blank cover plates for any outlets or junction boxes that are to be left in place and from which all cables have been removed. Cover plates shall match the Project standard color and finish.
E. Equipment: The Contractor shall remove all equipment abandoned as part of this project. The Contractor shall be responsible for the delivery of this equipment to a proper recycling facility. Any electrical service connected to the equipment shall be properly decommissioned and labeled to prevent any safety issues.
F. Right of Refusal: The Owner shall have first right of refusal to any abandoned cable or equipment. The Owner has the right to remove any components from the equipment before it is recycled.

3.07 FIRE STOPPING

A. Contractor is responsible for applying fire-stopping material in and around all openings that it creates or are created for it, whether or not specifically indicated in specifications or project drawings, where code requires the use of fire stopping material.
B. Contractor shall ensure that all fire-stopping materials meet appropriate codes and are installed in a neat and workman like manner.

3.08 WATERPROOFING

A. Contractor is responsible for creating a waterproof seal in and around any openings to the outside environment that are created by Contractor or for systems being installed.
B. Contractor shall ensure that all waterproof materials meet appropriate codes and are applied according to good engineering practice.

3.09 RACKS, CABINETS, AND HARDWARE

A. Racks and Cabinets: Contractor shall assemble and install racks and cabinets.
B. Installation Hardware: Install hardware in a secure manner. Screws shall be tightened to a torque just sufficient to secure equipment without deforming washers beyond their original diameter.
C. Considerations: Rack mount equipment shall be secured as recommended by the manufacturer with consideration to airflow, power, and in/out connections.

D. Cross Connections: Where cross connections are required between equipment, interconnections shall be installed using cable management devices to secure cables in a neat and workmanlike manner, applying best industry practices.

3.10 INSTALLATION REQUIREMENTS

A. Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed.
B. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a "break-away", or other approved method.
C. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of pathway entry and exit.
D. All cable shall be free of tension at both ends.
E. PLENUM rated cable shall be used in areas used for air handling or where required by code.
F. Contractor shall replace any cables that have been damaged or abraded during installation.
G. Pulling lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used and will not harden or become adhesive with age.
H. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit or surface mount raceway.

3.11 CABLE

A. Cable treatment: Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the rating of the manufacturer.
B. Splicing
    1. Voice, data, and other twisted pair cables: No splices shall be installed in any voice, data or twisted pair cables.
    2. Technology systems: No splices shall be installed in any cable less than five hundred (500) feet in length.
    3. Digital multimedia/video cables: No splices are allowed in any digital multimedia/video cable.
    4. Overhead paging systems: Cable splices for constant voltage overhead paging system shall occur only at speaker, amplifier or volume control knob locations.
C. Lengths
    1. Variations: Where cables are to be of the same length, variations in the length shall be less than plus or minus ½ inch. Lengths of cables are based on the length of the unterminated signal conductors.
    2. Labeling: Cables, regardless of length, shall be marked with a labeling scheme approved by Consultant.
    3. Service Loops: A surplus of cable, located at or near the point of termination to facilitate potential future changes, shall be provided where appropriate. Cables shall have a minimum cable slack of 10ft (3m) at the telecommunication room(s) and 3.28ft (1m) at each telecommunications outlet in the suspended ceiling unless noted otherwise. Service loops shall be stored in an extended loop or in a figure-eight configuration, not in bundled loops.
D. Grouping

1. Cables shall be separated into like groups according to signal or power levels.
2. Power Cable Group: Power cables shall be secured to one side of the rack separate from any low-energy signal cable groups. Separation shall be a minimum of 4” in all directions.
3. Signal Cable Group: Signal cables shall be grouped according to signal type and secured to one side of the rack separate from any power cable groups. Separation shall be a minimum of 4” in all directions.

E. In Equipment Racks
1. Equipment rack wiring and cabling shall be neatly dressed.
2. Fastening: Rack cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame.

F. Support for Cables Outside of Equipment Racks
1. External wire and cables shall be supported in maximum 5 foot intervals from the structure and as required to maintain less than 12 inches of cable sag between supports without over-tensioning the cables. Contractor shall vary the precise distance between cable supports on long runs to avoid harmonics issues.
2. Hardware: Cables shall be supported by J-hooks, cable tray, or ladder rack. Hardware shall be secured to building structure using 3/8” threaded rod supports.
   a. Right Angles: Cables are to run at right angles to the structure, placed above ceiling in halls or corridors.
   b. Height: Cables shall not run above red iron joist.

G. Concealment: Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests. Cabling systems installed in public areas shall be installed within walls, ceiling, or floors or within surface wiring pathways, as dictated by codes and good engineering practice.

H. Velcro Straps for Horizontal Cabling: Straps shall be installed snugly without deforming cable insulation. Straps shall be spaced at uneven intervals not to exceed 4 feet.

I. Cable Ties and Velcro Straps within Equipment Racks and Cabinets: Ties and straps shall be installed snugly, without deforming cable insulation, at uneven intervals not to exceed 8 inches. Cable ties shall only be used for non-signal carrying cables. No sharp burrs shall remain where excess length of the cable tie has been cut.

J. Obstruction: Contractor shall notify Owner immediately if any obstruction or hazard is discovered in a pathway provided by others.

3.12 CONNECTORS

A. Preparation: Cables shall be carefully prepared and connectors installed as directed by the manufacturer. Proper stripping devices and crimping tools shall be used.

B. Terminations: Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner suited to the service of the wire and as directed by the manufacturer. Contractor shall use manufacturer specified terminations when those specifications exist.

C. Soldering: A person skilled in that practice shall execute soldered terminations. Any excessive insulation displacement resulting from soldering shall be grounds to require the Contractor to re-terminate the connector.

D. Adapters: Adapters shall be used only where the identity of the necessary type of connector is unknown at the time of installation, such as for Owner-provided equipment or in anticipation of future equipment upgrades, with Consultant’s approval.

3.13 SPARE PARTS AND REMOTE CONTROLS

A. Keys: Contractor shall turnover all keys, tagged and organized by type on individual key rings, to Owner upon project completion.

B. Refer to individual sections for spare parts and remote control requirements.

3.14 EQUIPMENT INSTALLATION

A. General: Contractor shall make system properly operational and physically secure by mounting equipment and related accessories into furniture, consoles, and racks as required. Manufacturer's guidelines for installation shall be followed. Discrepancies in installation procedure or inability to complete a given task due to a shortage of materials or malfunctioning equipment shall be reported to Consultant immediately upon discovery.

B. Equipment Placement: Contractor shall locate equipment as indicated on drawings and as specified herein. Where such information is not provided, Contractor shall follow industry best practices and locate operable devices at convenient positions; heat generating devices at the top and seldom-accessed equipment below.

   1. Unless otherwise specified, end user-operable devices shall be positioned within the range of front wheelchair access per ADA standards.

C. Equipment Installation: Equipment shall be installed as directed by the manufacturer using equipment manufacturer's desktop mounting frames, equipment tubs, installation hardware, and techniques. Contractor shall be responsible for moving equipment from storage and for providing necessary personnel or devices to carry and lift equipment around obstacles and into operating position.

3.15 FIRMWARE

A. Firmware shall be latest version supported by software and/or equipment as of Date of Acceptance.

3.16 ROUGH-IN

A. Scheduling: Contractor shall make every effort to install systems per this specification in a timely manner including rough-in of cabling and other apparatus where appropriate to stay on schedule.

B. Protection of Environment: Where cabling and/or equipment is installed prior to other trades completing their work in an area, Contractor shall take necessary precautions to cover, wrap, or otherwise protect to reduce possible damage which may result from plastering, painting, cleaning, or other such work completed after installation and before substantial completion of the project.

3.17 CUTTING, DRILLING, PATCHING, AND PAINTING

A. Coordination: Contractor is responsible for coordinating with the General Contractor and other trades when any cutting or drilling is required for the installation or proper performance of the specified systems.

B. Restoration: Contractor is responsible for returning all surfaces (including walls, floors, and ceilings) to their previous condition after any cutting including painting.

C. Painting: Contractor is responsible to paint all new work including exposed pathway to match the conditions.

3.18 LABELING

A. General: Rack-mounted equipment and hardware shall be labeled as required herein. Connectors, jacks, receptacles, outlets, cables, cable terminations, terminal blocks, rack mounted equipment, active slots of card frame systems, etc. shall be clearly, logically, and permanently labeled in a manner acceptable to Consultant.

B. Approval: Proposed wording and/or numbering schemes for labeling shall be provided to Consultant for review and written approval prior to procurement or installation.

C. Labels used shall be permanent and secure. Provide labeling as follows unless otherwise noted in a specific section:

   1. Like Size: All labels, including engraved labels, shall be sized to match other labels used for same purpose.
   2. Equipment Racks: For enclosed racks containing equipment, provide labels on each equipment rack rear door or console rear panel reading "No user serviceable parts. Refer service to qualified technician."

3. Installer and Consultant Identification: Position at the front top center section of each equipment rack a label that states the names of system Installer and Consultant.
4. Custom Panels: Custom panel nomenclature shall be engraved, etched, or screened. Markings are to be designed to ensure consistency and clarity within and without of system. Verify markings and placements by submitting label sample layouts to Consultant for approval prior to procurement.
5. Documentation: Labeling information shall appear on the as-built drawings.

3.19 FIRE-STOPPING

A. If Contractor removes anything from an opening in a fire-rated wall, Contractor shall restore the fire-rating condition of the wall to the same condition as before Contractor started its work. Depending on the size of the opening, this may involve sheetrock patching, in addition to use of other appropriate fire-stopping materials

3.20 ADDITIONAL ENGINEERING SERVICES

A. General: Contractor is responsible for securing necessary engineering services where needed to meet the needs of the installation.
B. Change Orders: Only when Contractor can show that additional engineering services are needed as a result of changes to the scope of the services being requested in the contract documents will Owner entertain a Change Order Request for these services.

3.21 TESTING

A. Procedure: Contractor shall develop a rigorous testing procedure to ensure full functionality and durability of installed systems under heavy-use conditions.
B. Supplies: Contractor shall supply testing equipment needed to verify compliance with specifications found in these documents.
C. Schedule: Contractor shall complete required testing prior to the substantial completion inspection by Owner and Consultant.
D. Data: Test data shall be properly documented and recorded so that it is available for final inspection.
E. Quality Control: Testing may be repeated during the inspection process at the request of Owner or Consultant.
F. Prior to energizing or testing the system, Contractor shall ensure the following:
    1. Installation: Products are installed in a proper and safe manner per the manufacturer’s instructions.
    2. Cleanliness: Products are neat, clean, and unmarred and parts securely attached. Dust, debris, solder, splatter, etc. is removed.
    3. Cables and Connections: Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
    4. Grounding: Electronic devices are properly grounded.
    5. AC Power: Each AC power receptacle is tested with a circuit checker for proper hot, neutral, and ground connections prior to connecting equipment.

3.22 GROUNDING

A. Refer to Section 27 05 26 for specific Grounding and Bonding installation requirements.

3.23 TRAINING PROGRAM

A. Contractor shall provide training in the manner delineated below in addition to specific requirements identified in subsequent sections.
B. Contractor shall provide audio-video recording of each training session to Owner.
C. Prior to scheduling or delivering End User training, Contractor shall confirm that:
    1. Closeout submittals have been accepted by Owner and Consultant.
    2. Final closeout inspection has been completed and punch list items rectified.
    3. Training schedule dates have been coordinated with and approved by Owner and Consultant.

D. Training shall include:
    1. Approved handouts.
    2. Practical and comprehensive operation of systems.
    3. Basic system troubleshooting techniques.
    4. Basic system maintenance.

E. Training Blocks
    1. Training time is defined as those hours specifically set aside for the sole purpose of training end users. Credited time will not be given for any time spent providing instructions to the Owner's staff for a system not completed or that has not passed final acceptance by the Owner and Consultant, or training performed outside of the approved training program.
    2. This training will be divided into training session "Blocks" as coordinated with the Owner.
        a. The first training session block shall consist of training intended for the common system operators. Such training, at a minimum, shall include the day to day use of the system.
        b. The second training session block shall consist of training administrators on the day to day administration of the system. Such training, at a minimum, shall include use of the administration control functions of the systems, user setup, and filtering and pulling reports.
        c. The third training session block shall consist of training administrators on system troubleshooting, maintenance, and updates. Such training, at a minimum, shall include using the system tools to diagnose issues, diagnosing common physical equipment issues, performing simple maintenance, and performing system updates.
        d. The forth training session block shall consist of a training session structured for high-level users, for example staff trainers who will provide instruction to other users and will include advance system configuration and operational knowledge needed to maintain and manage all specified technology systems. The Contractor may elect to engage the Manufacturer(s) in certifying the high-level end users in the systems at no cost to the Owner.

F. The Contractor shall issue a certificate of training completion to the trainees upon completion of their training. Such certificates must be signed by both the trainer and trainee(s) for the Contractor to receive training credit.

3.24 WARRANTY AND MAINTENANCE PROGRAM

A. Contractor shall provide a warranty conforming to the stipulations below in addition to specific requirements identified in subsequent sections.

B. As part of the base proposal cost, the Contractor shall include a 1-year turnkey warranty period with full support costs.
    1. Pricing for warranty services to be provided in years two through five shall be itemized on the Contract's Unit Pricing Form as part of a complete response. The Owner may fund the additional warranty services separately or not at all at the Owner's discretion.

C. The Warranty period shall begin after all punch list items have been rectified. The Contractor shall receive a letter of completion from the Consultant and Owner indicating project completion and starting the warranty period.

D. The warranty and support work included in this contract shall cover the following materials, software, and services, without additional cost to the Owner:
    1. Inspections, preventative maintenance, and testing of equipment and components. The Contractor shall schedule a 10-month on-site preventative system review 10-months into each year of warranty and support including system inspections, preventive maintenance, software upgrades/patches, and testing of equipment and components.

2. Regular Service, Emergency Service, and Normal Service.
3. Labor, travel, equipment, materials, and transportation cost for all services covered by this warranty.

E. Response Time: Contractor shall respond to calls for warranty services in a timely manner as delineated below.
   1. The Owner reserves the right to make the final determination of emergency or normal service calls and the right to coordinate the best times for service of any system failure.
   2. Emergency service calls are defined as failures which prohibit the use of a typical system function(s) and pose a life safety concern, or such failures which cause a major impact to the Owner's daily operations.
      a. The Contractor shall provide remote service diagnosing the impact within two (2) hours after notification by the Owner.
      b. If remote service does not correct the reported issue, the Contractor shall provide on-site service correcting the impact within four (4) hours after notification by the Owner.
   3. Normal service calls are defined as failures which prohibit the use of typical system function(s) but which do not inhibit critical system usage, do not pose life safety concerns, and do not create a major impact to Owner's daily operations.
      a. The Contractor shall provide remote service correcting the impact within twenty-four (24) hours after notification by the Owner.
      b. If remote service does not correct the reported issue, the Contractor shall provide on-site service correcting the impact within forty-eight (48) hours after notification by the Owner.
   4. The Contractor shall supply Service Request forms and or proper contact procedure to the Owner with instructions for proper notification of the Contractor for warranty service. By following said instructions, the Owner shall constitute proper notification for any needed warranty service

F. Repair Time: Contractor shall locally stock critical parts in sufficient quantities such that emergency repair or replacement shall be guaranteed within twelve (12) hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality and provided permanent replacement is achieved within ninety-six (96) hours. Contractor may contact the Owner for use of Owner supplied spare parts where delay of system repair will have negative impact on system performance.

G. Transmittal: A copy of this Warranty shall be delivered to and signed for by the Owner's representative whose primary responsibility is the operation and care of these systems. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.

H. Registration: Contractor shall register Warranty papers for all equipment and software in the name of the Owner and furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.

I. Subcontracting: Warranty service work may not be subcontracted except with specific permission and approval by the Owner.
   1. Service/Warranty Procedures: Contractor shall submit a warranty service plan containing all contact information and Owner service call directions for Owner review with project close-out submittals.

J. Resolution of Conflicts:
   1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory and stating specific areas of dissatisfaction in writing.
   2. If the Contractor or his approved Subcontractor does not resolve such stated areas of dissatisfaction within ninety-six (96) hours, the Owner may appoint an alternative service agency or person to fulfill the terms of the Warranty at the expense of the

Contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

END OF SECTION

SECTION 27 0500
COMMUNICATIONS GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 00 00 for additional project scope information.
B. This section describes the products and execution requirements related to furnishing and installing Category 5e/6/6a Cabling and Termination Components and related subsystems as part of a Structured Cabling System.
C. Backbone system comprising copper and fiber optic cabling and horizontal (station) cabling is covered under this document.
D. Others will provide the network electronics for the LAN within the Telecom Rooms (TRs) and will be responsible for connecting the new cabling infrastructure to the LAN. The Contractor, however, shall supply the patch cords. The Contractor shall be available on site during the crossover to assist with any cabling issues that may occur during the connection.
E. The Electrical Contractor shall install conduits and surface raceway for new technology outlet locations unless otherwise noted.
F. The Telecommunication Contractor shall provide and install all sleeves through the wall penetrations as required whether or not specifically marked on Project Drawings, unless otherwise noted.
G. All cables and related terminations support, and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following section(s).
H. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the Electrical Code in the state where the work is to be performed, and present manufacturing standards.
I. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0523 – Pathways for Technology Systems
C. Section 27 0526 – Grounding and Bonding for Technology Systems
D. Section 27 1100 – Communications Equipment Rooms
E. Section 27 1300 – Communications Backbone Cabling
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 3000 – Voice Communications
J. Section 27 4000 – AV/Multimedia General Requirements
K. Section 27 6000 – Physical Security General Requirements
L. Section 27 6200 – Electronic Access Control System
M. Section 27 6400 – Video Surveillance System
N. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

B. All references relate to the current version adopted by the city/county according to the authority having jurisdiction (AHJ). If the city/county has not adopted a version the latest version shall be utilized.
C. ASTM B633: Specification for Electrodeposited Coatings of Zinc on Iron and Steel
D. ASTM A653: Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process
E. ASTM A123: Specification for Zinc (Hot Galvanized) Coatings on Iron and Steel
F. ASTM A510: Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
G. ANSI/TIA 569-C: Telecommunications Pathways and Spaces
H. ANSI/TIA 568-C.0, 1, 2, 3, 4: Commercial Building Telecommunications Standard
I. ANSI/TIA-598-C-2005 – Optical Fiber Cable Color Coding
J. ANSI/TIA 606-B: Administration Standard for Telecommunications Infrastructure
K. ANSI/TIA 942-A: Telecommunications Infrastructure Standard for Data Centers
L. ANSI/TIA 607-B: Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
M. IEEE: National Electrical Safety Code® (NESC®) standards.ieee.org/about/nesc

1.05 QUALIFICATIONS

A. Refer to Section 27 00 00 for additional requirements.
B. Premises Distribution System: Written certification that the premises distribution system complies with the EIA ANSI/TIA/EIA-568-C.0,1, 2, 3, EIA ANSI/TIA/EIA-569-B, and ANSI/TIA/EIA-606-A.
C. Materials and Equipment: Where materials or equipment are specified to conform, be constructed, or be tested to meet specific requirements, Contractor shall supply, upon request by Consultant or Owner, certification that the items provided conforms to such requirements. Certification by a nationally recognized testing laboratory that a representative sample has been tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specifications.
D. Certifications
    1. The Contractor shall have an RCDD (Registered Communication Distribution Designer) on staff assigned to manage this Project; documented proof shall accompany the proposal response.
    2. All installing personnel shall have completed and be certified in manufacturer training or BICSI (Building Industry Consulting Service International) installation training for UTP infrastructure systems, or the Contractor shall contract with manufacturer for installation of all proposed components. Company Certifications shall accompany the proposal response.
    3. The Contractor's technicians shall be certified and trained in the connectivity hardware which is being installed.
    4. The Contractor shall submit certification that installers are factory certified to install and test the provided products. No less than half of the crew to be used for the telecommunications installation shall be trained by that manufacturer for the work.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Shop Drawings in addition to requirements in Section 27 0000:
    1. Equipment rack elevation details
    2. Elevations of telecommunication room walls with planned mounted equipment
    3. Outlet faceplate details for all outlet configurations, sizes, and cable types
    4. Overhead telecommunication room enlargements, providing dimensions of room and clearance for maintenance and operation

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for requirements.
   1. Data cable test results
   2. Digital medium containing:
      a. As-built drawings (CAD format)
      b. As-built drawings (PDF format)
      c. Detailed test results in original tester format (e.g. Fluke Linkware)
      d. Detailed cable test results in PDF format
   3. Warranty certification from connectivity manufacturer

1.09 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall be responsible for all materials until completion of Project.
B. Cable shall be stored according to manufacturer's recommendations at minimum. In addition, cable shall be stored in a location protected from vandalism and weather.
C. If cable is stored outside, it shall be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees Fahrenheit, the cable shall be moved to a heated (minimum 50 degrees Fahrenheit) location. If necessary, cable shall be stored off site at the Contractor's expense.
D. If the Contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.
E. Commercial off-the-shelf manuals shall be furnished for operation, installation, configuration, and maintenance for all products provided as a part of the premises distribution system. Specification sheets for all cable, connectors, and other equipment shall be provided.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 FIRE STOPPING MATERIALS

A. Refer to Section 27 0000 for additional requirements.

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.02 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.03 WARRANTY

A. Refer to Section 27 0000 for additional requirements.
B. The Contractor shall provide to the Owner a manufacturer's 15-year minimum warranty certificate for all materials, equipment, etc. Upon successful completion of the installation and subsequent inspection, the Owner shall receive the numbered certificate from the manufacturing connectivity hardware (patch panels, jacks, parch cords 110 blocks, etc.) company registering the installation. This warranty shall include all labor, materials, and travel time.

C. The warranty shall ensure against product defects and guarantee that all approved cabling components exceed the specifications of TIA/EIA-568-C and ISO/IEC IS 11801 for cabling links/channels, and that the installation will exceed the loss and bandwidth requirements of TIA/EIA 568-C ISO/IEC IS 11801 for fiber links/channels for a fifteen (15) year period. The warranty shall apply to all passive structured cabling system components.
D. The warranty shall cover the failure of the wiring system to support the application that it was designed to support, as well as additional application(s) introduced in the future by recognized standards or user forums that use the TIA/EIA 568-C or ISO/IEC IS 11801 component and link/channel specifications for cabling. Such warranty shall apply for a minimum of a fifteen (15) year period.
E. The warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective products(s), labeling of the new components, and testing of the circuit(s) at no cost to the Owner.

3.04 EXAMINATION

A. Verification of Conditions: Contractor shall examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and timely completion.
B. Contractor shall verify that cable lengths comply with published standards.
C. Contractor shall notify Owner of any proposed installation which is expected to exceed maximum lengths prior to installation of cable.
D. Contactor shall consult with Owner regarding alternative routing or location of cable.
E. Contractor shall not proceed until unsatisfactory conditions have been corrected.

3.05 SPARE PARTS

A. Suggested List: Contractor is requested to submit a list of suggested spare parts with an offered price, allowing Owner to select appropriate parts.
B. Means of Obtainment: Contractor shall state where spare parts can be obtained after the installation.

3.06 INSTALLATION REQUIREMENTS

A. Refer to Section 27 0000 for additional requirements.

3.07 COOPERATION

A. The Contractor shall cooperate with other trades and General Contractor’s personnel in locating work in a proper manner.
B. Should it be necessary to raise, lower, or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

3.08 TESTING AND ACCEPTANCE

A. The Contractor shall perform acceptance tests as indicated below for each subsystem (backbone, station, etc.) as it is completed.
B. The Contractor shall supply all equipment and personnel necessary to conduct the acceptance tests. Prior to testing, the Contractor shall provide a summary of the proposed test plan for each cable type, including equipment to use, setup, test frequencies or wavelengths, results format, etc. The Consultant will approve the method of testing.
C. The Contractor shall visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. The Contractor shall provide the Consultant with a written certification that this inspection has been made.
D. The Contractor shall conduct acceptance testing according to a schedule coordinated with the Consultant. Representatives of the Owner may be in attendance to witness the test procedures. The Contractor shall provide a minimum of one (1) week advance

notice to the Consultant and Owner to allow for such participation. The notification shall include a written description of the proposed conduct of the tests, including copies of blank test result sheets to be used.

E. Tests related to connected equipment of others shall be done only with the permission and presence of Contractor involved. The Contractor shall ascertain that testing only as required to prove the wiring connections are correct.

F. The Contractor shall provide Consultant with test results and descriptions of the testing methodology, including the date of the tests, the equipment used, and the procedures followed. At the request of the Consultant, the Contractor shall provide copies of the original test results.

G. All cabling shall be 100% fault free unless noted otherwise. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the Contractor's expense. The applicable tests shall then be repeated.

H. Backbone voice cables shall be free of shorts within the pairs and be verified for continuity, pair validity and polarity, and conductor position on the termination blocks (e.g., 110). Any mispositioned pairs shall be identified and corrected. The percentage of "bad" pairs shall not exceed 1% in any backbone (riser or tie) cable based on total pair count. All bad pairs shall be identified and documented.

I. The Consultant or Owner may request that a 10% random field re-test be conducted on the cable system to verify documented findings.

   1. If requested, the Contractor shall test up to 10% of cable links at no cost to the Owner.
   2. Tests shall be a repeat of those defined above and under Testing and Acceptance. If findings contradict the documentation submitted by the Contractor, additional testing shall be performed to the extent determined necessary by the Consultant, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.09 FIRE STOPPING

A. Contractor shall seal any openings created for cable pass-through between floors or through fire rated walls. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.

B. Creation of such openings as are necessary for cable passage between locations as shown on the Drawings shall be the responsibility of the Contractor. Any openings created by or for the Contractor and left unused shall also be sealed as part of this work.

END OF SECTION

SECTION 27 0523
PATHWAYS FOR TECHNOLOGY SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 00 00 for additional project scope information.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0526 – Grounding and Bonding for Technology Systems
D. Section 27 1100 – Communications Equipment Rooms
E. Section 27 1300 – Communications Backbone Cabling
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 3000 – Voice Communications
J. Section 27 4000 – AV/Multimedia General Requirements
K. Section 27 4100 – Audio Visual Systems
L. Section 27 5100 – Distributed Communications Systems
M. Section 27 6000 – Physical Security General Requirements
N. Section 27 6200 – Electronic Access Control System
O. Section 27 6400 – Video Surveillance System
P. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 0000.

2.02 WIRE BASKET TRAY RUNWAY

A. As shown on the Project Drawings, the Contractor shall provide and install sufficient wire basket tray runway systems to support horizontal cable bundles.

B. The Contractor shall provide all necessary labor, supervision, materials, equipment, tests, and services to install complete wire basket tray runway systems.
C. Wire basket runway systems shall include, but are not limited to, straight sections of continuous wire mesh, field formed horizontal and vertical bends, tees, drop outs, supports, and accessories.
D. Specifications and Drawings are for assistance and guidance, but exact routing, locations, distances, and levels will be governed by actual field conditions.
E. Contractor shall ensure that all straight section longitudinal wires are installed with no bends, kinks, or twisting.
F. Wire basket runway shall be made of high strength steel wires and formed into a standard 2-inch by 4-inch wire mesh pattern with intersecting wires welded together. All wire ends along runway sides (flanges) shall be rounded during manufacturing to prevent damage to cables and injury to installers.
G. All fittings shall be field formed as needed.
H. All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 stainless steel. Splicing assemblies shall provide a continuous ground connection.
I. Wire Basket Tray shall be grounded only at the Telecommunications Room ground bus bar.
J. Cable Drop Out/Waterfall
    1. Where cables bundles transition from tray to tray or tray to conduit or sleeve of varying elevations the Contractor shall provide and install a radius control device. This device shall be a waterfall or drop out device and shall be properly sized to accommodate cable bundle plus 20% future growth.
K. T-sections of tray shall be made using T-section fittings.
L. Straight section splices shall be made using splice plates.
M. Wire basket runway supports shall be of the trapeze hanger type.
N. Trapeze hangers shall be supported by 3/8 inch diameter rods.
O. Tray shall have an electro zinc finish or a flat Black finish wherever finished installation will be visible to end users.
P. Accessories (connectors, splice plates…) shall be painted to match tray finish.
Q. Contractor shall refer to project drawings for cable tray sizing.
R. Manufacturer: Cable trays and accessories shall be of one of the following manufacturers
    1. Cooper B-Line
    2. Legrand Cablofil
    3. Pentair Hoffman
    4. Or approved equal

2.03 CABLE HOOK SYSTEMS

A. In the areas where the cables are required to be run in a “free-air” plenum, a cable hook system shall be used.
B. Cable hooks shall be capable of supporting a minimum of 30 lbs. with a safety factor of 3.
C. Spring steel cable hooks shall be capable of supporting a minimum of 100 lbs. with a safety factor of 3 where extra strength is required.
D. Cable hooks shall be Category 6a or better rated.
E. Follow manufacturer’s recommendations for allowable fill capacity for each size of cable hook.
F. Installation and configuration shall conform to the requirements of the ANSI/ EIA/TIA Standards 568A & 569, NFPA 70 (National Electrical Code), and applicable local codes.
G. Cable hooks shall:
    1. Have a flat bottom and provide a minimum of 1 5/8" cable bearing surface.
    2. Have 90-degree radiused edges to prevent damage while installing cables.

3. Be designed so the mounting hardware is recessed to prevent cable damage.
4. Have a steel cable latch retainer to provide containment of cables within the hook.
5. Have a retainer that shall be removable and reusable.
6. Be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, and floor posts, to meet job conditions.

H. Factory assembled multi-tiered cable hooks shall be used where required to provide separate cabling compartments, or where additional capacity is needed.
I. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653 G90. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.
J. Cable hooks for corrosive areas shall be stainless steel, AISI type 304.
K. Cable hooks shall be B-Line series BCH21, BCH32 or other manufacturer that meets these specifications

2.04 SURFACE RACEWAY

A. In areas where surface raceway will be used as a cable path, no exposed cable shall be permitted.
B. With the agreement of the Consultant and Owner, where telecommunications outlets are to be located in areas where the walls cannot be fished, the station wire serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, conference rooms, or like facilities. Contractor shall attempt to fish hollow walls, use existing conduit, or exhaust all other options to conceal cabling prior to installing surface raceway.
C. The raceway shall originate from a surface mounted box located off the floor, be attached to the wall, and terminate above the ceiling. The outlet box height shall match existing electrical receptacle height. Raceway for wall-mounted phone locations shall originate from a surface mounted box with the top of the box located 48" off the floor.
D. Raceway finish shall match finish of project electrical raceway. All fittings including but not limited to extension boxes, elbows, tees, and fixture boxes shall match the color of the raceway.
E. Telecommunication outlet faceplates shall match electrical faceplate standards for finish.
F. The raceway and all system devices shall be UL listed, exhibit nonflammable self-extinguishing characteristics, tested to specifications of UL94V-0, and be Category Compliant as defined by TIA/EIA 568.
G. Raceway turns or bends shall conform to manufacturer specifications or recommendations and industry best-practices for UTP and fiber optic cable minimum bend radius.
H. Non-Metallic raceway systems:
    1. Non-metallic surface raceway shall have an adhesive-applied base and have a hinged snap-on cover. The raceway shall be manufactured of natural PVC compounds.
    2. The raceway system shall be made up of the following components:
        a. Raceway channel shall be Panduit LD5.
        b. Surface mount outlet boxes shall be Panduit JBX3510EI-A.
        c. Dropped ceiling connectors shall be Panduit DCF5EI-X or DCEFXEI-X.
        d. Right angle fittings shall be Panduit RAFC5EI-X.
        e. Coupler fittings shall be Panduit CFX5EI-X.
I. All raceway systems shall be installed complete as specified herein and in manufacturer recommendations.

2.05 CABLE PATHWAY SLEEVES

A. The Contractor shall only provide when re-enterable sleeves are not possible.
B. The Contractor shall provide all necessary wall penetration for cable pathways whether or not specifically shown on Project Drawings.

C. All wall penetrations shall have a metallic sleeve(s) as required to maintain a maximum 40% fill ration.
D. All sleeves shall be properly firestopped by this Contractor.
E. Contractor shall provide all core holes, pathways and sleeves (minimum 1.25" c).
F. Contractor shall install non-metallic threadless insulating bushings on end of all conduits.
G. Conduit Core Holes and Sleeves thru Floor: For all floor penetrations, Contractor shall provide IMC conduits with threaded steel couplings set flush with finish floor. Extend 6” above finish floor with IMC before any termination.

2.06 RE-ENTERABLE FIRESTOP SLEEVES

A. Manufacturer:
   1. Hilti Speedsleeve

2.07 METAL CONDUITS AND FITTINGS

A. General Requirements for Metal Conduits and Fittings:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.
   3. GRC: Comply with ANSI C80.1 and UL 6.
   4. EMT: Comply with ANSI C80.3 and UL 797.
   5. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
      a. Fittings for EMT:
         1) Material: Steel
         2) Type: Setscrew
   6. Expansion Fittings: Steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.08 OUTLET BOXES

A. General Requirements for Outlet Boxes
   1. Comply with TIA-569-B.
B. Metallic outlet boxes and device covers shall be galvanized steel not less than 1/16" thick.
C. The dimensions of the metallic outlet box shall be 2"x4", 4"x4" and 6"x4" with a minimum depth of 2.5". See drawings for details.
D. Metallic outlet boxes shall be equipped with single device cover (or two-device cover where needed).
E. Where installed in plaster, gypsum board, etc., covers shall be raised to compensate the thickness of the wall.
F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
G. Where metallic outlet boxes are to be empty for future use, blank covers shall be used.
H. Gangable boxes are not allowed.

2.09 UNDERGROUND ENCLOSURES (HANDHOLES)

A. Handholes shall conform to the following dimensions unless noted otherwise (W x L x D):
   1. 24” x 36” x 48” – assists the cable placing operation
   2. 30” x 48” x 48” – for splice and cable slack storage
B. Handhole load rating shall be appropriate for the environment in which it will be installed.
C. Handholes shall be placed at strategic splice and installation assistance locations or as required by environmental and/or existing topographical conditions. Handholes shall be placed using the following guidelines:

1. A handhole shall be placed within 300-feet of the penetration point to the building.
2. A handhole shall be placed where conduit bend radius equals or exceeds 90-degrees.
3. The length of conduit sections between handholes shall not exceed 1,200-feet.
4. Handholes shall be placed with the long dimension in line with the fiber run.
5. The location of the handhole shall be away from traffic conditions and shall be easily accessible for maintenance.
6. Handhole shall be installed to allow continuing water drainage.
7. Handhole shall be placed on 4-6-inch-deep rock/gravel bottom contained by wire mesh that allows drainage from the enclosure and secures the rock/gravel in place to solidify the base of the enclosure.
8. All conduits installed within the enclosure shall be sealed to prevent moisture incursion within the ducts.

2.10 PAINTING

A. The Contractor is responsible for painting all exposed pathway, boxes, fittings, etc. The paint shall match the surrounding conditions and may change mid-run.

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.02 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.03 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.04 WIRE BASKET TRAY RUNWAY

A. Basket tray shall be installed in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of NEC, applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.
B. Coordinate installation of wire basket runway with other electrical work as necessary to properly interface installation of wire basket runway with other work.
C. Provide sufficient space encompassing wire basket runways to permit access for installing and maintaining cables.
D. Test wire basket runways to ensure electrical continuity of bonding and grounding connections and to demonstrate compliance with specified maximum grounding resistance.

3.05 CABLE HOOK SYSTEM

A. J-hooks fabricated to contain data/voice and video cables may be used to support 25 or fewer cables in each hook. J-hooks are to be fastened to building steel with beam clamps, suspended from ceiling slab with threaded rod, or anchored to the wall. All J-hooks shall be hung straight and level. No other installation technique will be authorized unless pre-approved.
B. Three tiered double-sided J-hook configurations shall contain a maximum of 25 cables per hook or 150 cables. Smaller configurations may be used as bundles decrease in size, maintaining no more than 25 cables per hook.
C. Bundles surpassing 150 cables shall be supported by hangers, fabricated of 3/8" threaded rod and 24" Unistrut. Hangers shall also be installed where the installation of a three-tiered J-hook system is not appropriate for the ceiling space, or where blocked by other trades' work.
D. Cable bundles consisting of fewer than 10 cables may be supported by single J hooks.

E. All cable support in the main cable path shall be installed every four feet. Small cable bundles (under 25) not in the main path may be supported every five feet.
F. A sag shall be maintained between supports of 6”, to reduce cable strain. Velcro is an appropriate method of securing cables, when properly used and not over tightened.
G. Proper cable support is extremely important to the Owner, and care shall be taken by the Contractor to provide and install the appropriate supports. Supports found to be inadequate will be replaced.
H. Cable bundles including voice/data cabling shall not have plastic cable ties.
I. All cable trunks shall have radius controlled cable waterfalls where trunk drops from conduit, sleeve or tray from horizontal path to vertical path.

3.06 SURFACE RACEWAY SYSTEM

A. In areas where surface raceway will be used as a cable path, no exposed cable shall be permitted.
B. With the agreement of the Consultant and Owner, if a telecommunications outlet is required in an area where the walls cannot be fished, the station cable serving these outlets shall be covered with raceway. No exposed cable shall be permitted within offices, laboratories, and conference rooms, or like facilities. Contractor shall attempt to fish hollow walls, use existing conduit, or exhaust all other options to conceal cabling prior to installing surface raceway.
C. The raceway shall originate from a surface mounted box located off the floor and be attached to the wall and terminate above the ceiling. The outlet box height shall match existing electrical receptacle height. Raceway for a wall-mounted location shall originate from a surface mounted box with the top of the box located 48" off the floor.
D. Minimum bend radius shall be adhered to for UTP and fiber optic cable.
E. Where raceway is to be installed on painted, smooth, finished surfaces, the Contractor shall clean surface prior to installing raceway.
F. Where non-metallic raceway is to be installed on non-smooth surfaces such as wallpaper, unpainted brick, concrete, etc., the Contractor shall use screws in addition to the adhesive backing to fasten channel to surfaces.
G. Where Contractor is required to install metallic raceway, the raceway base shall be installed using screws and following all manufacturer’s recommendations.
H. Where new outlet locations are indicated on Project Drawings as having existing Wiremold™ type raceway, the Contractor shall remove existing raceway from wall and install new specified raceway to cover any damage or markings caused from removing existing raceway product.
I. All surface raceway shall be mounted level and plumb. Where the Owner considers raceway channels to be installed unsatisfactorily, the Contractor shall remove and replace necessary channels at no additional cost to the Owner.
J. Suitable insulating bushings and inserts shall be used at connections to outlets and corner fittings. Dropped ceiling end fittings shall be utilized where raceway channel connects to dropped accessible ceiling tile. In rooms with drywall ceilings, open ceilings, or non-accessible ceilings, the Contractor shall extend raceway to the nearest location, hallway, or corridor that has accessible ceiling cavity. All cables shall be concealed.

3.07 PATHWAY APPLICATIONS

A. Indoors: Apply pathway products as specified below unless otherwise indicated:
    1. Exposed, Not Subject to Physical Damage: EMT
    2. Concealed in Ceilings and Interior Walls and Partitions: EMT
B. Minimum Pathway Size for Data: 1-inch trade size. Cable fill shall not exceed a 40% fill ratio.
C. Pathway Fittings: Compatible with pathways and suitable for use and location.
    1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
    2. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.

3.08 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
B. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
C. Complete pathway installation before starting conductor installation.
D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
E. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.
F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
G. Support conduit within 12 inches of enclosures to which attached.
H. All conduit penetrations shall comply with all applicable fire codes. All conduit penetrations in fire-rated walls or floors shall be sealed and fire proofed to at least the rating of the penetration area.
I. Conduits shall be routed in the most direct route, with the fewest number of bends.
J. There shall be no continuous conduit sections longer than 100 feet. For runs that total more than 100 feet, insert junction or pull boxes (or gutters if appropriate) so that no continuous run between pull boxes is greater than 100 feet.
K. There shall be no more than two 90-degree bends (180 degrees total) between conduit pull boxes.
L. Changes in direction shall be accomplished with sweeping bends observing minimum bend radius requirements above. Do not use pull boxes for direction changes unless specifically designated otherwise in the Drawings.
M. Stub-ups to Above Recessed Ceilings:
    1. Use EMT for pathways.
    2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
O. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
Q. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
R. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb. tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

3.09 OUTLET BOXES

A. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
B. Exact locations of the outlet boxes shall be coordinated with the electrical contractor and other trades.
C. The approximate locations of the outlets are indicated on the drawings. The exact locations shall be determined at the building. The right is reserved to change without additional cost, the exact location of any outlet, a maximum of 10' before it is permanently installed.

D. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a rain tight connection between box and cover plate or supported equipment and box.
E. Horizontally separate boxes by a minimum of 12" mounted on opposite sides of walls so they are not in the same vertical channel.
F. Outlet boxes installed back to back in fire-rated walls shall be separated horizontally by a minimum of 24".
G. Install all outlet boxes in finished areas flush with the wall. Maintain ¼" or less space between outlet box front and finished wall surface.
H. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
I. Outlet boxes shall be firmly anchored in place and shall not depend on the cover plate to hold it secure to the wall.
J. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
K. Any surface boxes shall have rounded corners and edges. Surface boxes must be approved by Owner prior to installation.

3.10 RISER CONDUITS

A. Conduits entering equipment rooms shall be reamed or bushed and terminated not more than 4" from a wall and within 12” of room corners.
B. Conduits entering equipment rooms from below floor shall be terminated not more than 4" above finished floor.
C. Conduits shall not be less than 4" trade size and be equipped with a measured pull line at 12” increments rated at a minimum 1200 pound test.
D. Provide restorable fire stops inside and around conduits as recommended by UL1479 or ASTM E814 for all conduits penetrating fire-rated construction.
E. Provide an insulating press fit bushing on all telecommunications riser conduits. Bushings must be rated to be used in an environmental air handling space (Plenum).

3.11 SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.12 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

END OF SECTION

SECTION 27 0526
GROUNDING AND BONDING FOR TECHNOLOGY SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 00 00 for additional project scope information.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 1100 – Communications Equipment Rooms
E. Section 27 1300 – Communications Backbone Cabling
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 4000 – AV/Multimedia General Requirements
J. Section 27 4100 – Audio Visual Systems
K. Section 27 5100 – Distributed Communications Systems
L. Section 27 6000 – Physical Security General Requirements
M. Section 27 6200 – Electronic Access Control System
N. Section 27 6400 – Video Surveillance System
O. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. IEEE C2 - National Electrical Safely Code
B. IEEE Std. 837-2002, or latest version – Standard for Qualifying Permanent Connections Used in Substation Grounding
C. ANSI/TIA-607 - Commercial Building Grounding and Bonding Requirements for Telecommunications
D. NFPA 70E - Standard for Electrical Safely in the Workplace
E. ANSI/NECA/BICSI-607 - Telecommunications Bonding and Grounding Planning and Installation methods for Commercial Buildings
F. UL 467 - Standard for Grounding and Bonding Equipment
G. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 GROUNDING AND BONDING CABLE

A. The grounding and bonding cable shall be stranded copper conductors.
B. The grounding and bonding cables shall have a green jacket color and riser or plenum rated as required.
C. Feeder and Branch Circuit Equipment Ground: Size as shown on drawings, specifications, or as required by NFPA 70, whichever is larger. Differentiate between normal ground and isolated ground when both are used within the same facility.

2.03 GROUNDING AND BONDING BUSBARS

A. Telecommunications Main Grounding Busbar (TMGB)
   1. Factory-drilled solid copper with holes to accommodate lugs. Field manufactured busbars are not acceptable.
   2. 0.25” thick x 4” wide
   3. Sized for current applications and future growth, no less than 18”
   4. Insulated from its support
   5. Shall be an electro-tin plated busbar
   6. Maintain a minimum of 2” of clearance from wall
   7. UL listed and BICSI certified
B. Telecommunications Grounding Busbar (TGB)
   1. Factory-drilled solid copper with holes to accommodate lugs. Field manufactured busbars are not acceptable.
   2. 0.25” thick x 4” wide
   3. Sized for current applications and future growth, no less than 12”
   4. Insulated from its support
   5. Shall be an electro-tin plated busbar
   6. Maintain a minimum of 2” of clearance from wall
   7. UL listed and BICSI certified
C. Horizontal Equipment Rack or Cabinet Busbar
   1. Mounts to standard 19” Rack or Frame
   2. Capacity: 6 Double hole lugs
   3. Shall be an electro-tin plated busbar
   4. UL listed and BICSI certified
D. Vertical Equipment Rack or Cabinet Busbar
   1. Mounts to vertical rail or inside of cabinet in 19” or 23” equipment rack or frame.
   2. Capacity: 9 Double hole lugs
   3. Shall be an electro-tin plated busbar
   4. UL listed and BICSI certified

2.04 MECHANICAL CONNECTORS

A. Mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers, and lock washers shall be made of Silicon Bronze and supplied as a part of the connector body and shall be of the two bolt type.
B. Split bolt connector types are not allowed.
C. Connectors shall meet or exceed UL 467.

2.05 COMPRESSION LUGS

A. Shall be UL & CSA listed
B. Shall meet or exceed the performance requirements of IEEE 837, latest revision
C. Compression type

D. Shall be manufactured from pure wrought copper. Conductivity of this material shall be no less than 99% by IACS standards.
E. Shall be electro-tin plated
F. Lugs shall be 2-hole. Single hole lugs are not allowed
G. Long barrel that will allow a minimum of two crimps with standard industry colors
H. Each connector shall be filled with an oxide-inhibiting compound
I. Crimped with a compression, tool and die system, according to manufacturer's recommendation

2.06 TAPS

A. Connections to the Conductor shall be made with irreversible compression connectors
B. Shall be UL & CSA listed
C. Requires a minimum of (2) crimps for C Tap or H Tap, 1 crimp for I-Beam and busbar Tap
D. Crimp according to manufacturer's recommendation

PART 3 EXECUTION

3.01 GENERAL

A. Install products in accordance with manufacturer's recommendations.
B. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
C. Mechanical connections shall be accessible for inspection and maintenance.
D. No insulation shall be installed over mechanical ground connections.
E. Ground connection surfaces shall be cleaned and all connections shall be made so that disconnection or removal is impossible.

3.02 RESISTANCE MEASUREMENT

A. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 2 ohms.

3.03 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

A. The intended function of a TBB is to reduce or equalize potential differences between telecommunications systems. While the TBB will carry some current under ac power ground fault conditions, it is not intended to provide the only ground fault return path.
B. The TBB shall:
   1. Be connected to the TMGB & TGB.
   2. Be a continuous copper conductor that shall be sized no less than 6 AWG to a maximum of 3/0 AWG. The TBB shall be sized in accordance to the following table:

Linear Length – ft.	Size (AWG)
Less than 13	6
14 – 20	4
21 – 26	3
27 – 33	2
34 – 41	1
42 – 52	1/0
53 – 66	2/0
Greater than 67'	3/0

   3. The TBB conductors shall be installed and protected from physical and mechanical damage.

4. The TBB conductors should be installed without splices.
    a. Where splices are necessary, the number of splices should be kept to a minimum and they shall be accessible and located within telecommunications spaces or j-box labeled as a telecommunications bonding backbone splice.
    b. Joined segments of a TBB shall be connected using exothermic welding, irreversible compression-type connectors or equal.

C. A metallic cable shield shall not be used as a TBB.

3.04 GROUNDING EQUALIZER (GE)

A. The GE shall be a continuous copper conductor that shall be sized no less than 6 AWG to a maximum of 3/0 AWG. The GE shall match the size of the TBB.
B. The GE shall connect to the telecommunications grounding busbar(s) in the same-floor telecommunications rooms on the first, top, and every third floor in a building greater than 4 floors.
C. A metallic cable shield shall not be used as a GE.

3.05 TELECOMMUNICATIONS EQUIPMENT BONDING CONDUCTOR (TEBC)

A. Connects the TMGB/TGB to equipment racks and cabinets.
B. Shall be a continuous copper conductor that shall be sized per the length of cable.
C. Shall be separated from ferrous materials by 2” or be bonded to the ferrous metal.
D. May be routed within cable trays or suspended 2” under or off the side of the cable tray or ladder rack.
E. Shall be supported every 3ft.
F. 8” minimum bend radius.
G. May come cross other cable groups at a 90 degree angle only.
H. A metallic cable shield shall not be used as a TEBC.

3.06 RACK OR CABINET BONDING CONDUCTOR

A. A bonding conductor shall be used to connect the equipment racks and cabinets directly to the TMGB, TGB or underfloor ground mesh network.
B. All metallic enclosures, including remote mounted equipment cabinets and racks for telecommunications, security or audio/visual shall be bonded to the nearest TMGB or TGB using a minimum sized conductor of 6 AWG. Remote bonds shall be labeled on both ends stating the destination of the bond.

3.07 ELECTRICAL DISTRIBUTION PANEL (EDP)

A. The AC EDP serving the Telecommunications Room shall be bonded to the TMGB or TGB using a minimum of a 6 AWG cable.
B. A qualified electrician shall make all connections within an AC electrical distribution panel.

3.08 OPTICAL FIBER CONDUCTIVE CABLES

A. Conductive fiber-optic cables should be bonded and grounded as specified in the NEC.

3.09 CONDUIT AND SLEEVE BONDING

A. All conduits and sleeves entering a telecommunications room shall be grounded.

3.10 LADDER RACK AND/OR CABLE TRAY

A. All low voltage cable runway sections shall be bonded together and bonded back to the nearest Telecommunications Room the runway is serving as close TMGB or TGB as practical.
B. Maintain an 8” minimum bend radius on the TEBC.
C. Keep a 2” separation from other cables both power and telecommunications.
D. Remove any paint, oxidation, etc. from the runway surfaces that are being bonded.
E. Drill two holes as required to accommodate the 2-hole compression lug.
F. Apply a thin coat of antioxidant around the holes and on the surface where the lug will be in contact.

G. Attach straps to the runway using stainless steel hardware sized for the lug holes.
H. Wipe off any excess antioxidant after installation of the lug.

3.11 BUILDING STEEL

A. Each ground bus bar shall be bonded to building steel.
B. Remove any paint or fire stopping spray from the building steel.
C. Provide the appropriate bonding connector to connect to beams, trusses or other types of structure.

3.12 LABELING

A. Each grounding/bonding cable shall be labeled at the TMGB or TGB.
B. All taps to the TBB shall be within an enclosure and labeled as to its purpose.
C. Mechanical connectors shall be clearly marked with the catalog number, conductor size, and manufacturer.
D. Compression lugs shall be clearly marked with manufacturer, catalog number, conductor size, and required compression tool settings.

3.13 TESTING

A. Refer to Section 27 0000 for additional requirements.
B. Perform testing in accordance with test instrument manufacturer’s recommendations using the fall-of-potential method.

3.14 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.15 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

END OF SECTION

SECTION 27 1100
COMMUNICATIONS EQUIPMENT ROOMS

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 0000 for additional project scope information.
B. This section describes the products and execution requirements relating to telecommunications cabling, termination components, racks, pathways, telecommunication rooms and related subsystems. Covered systems include the following:
    1. Equipment room cable management system and equipment racks
    2. Horizontal and backbone cable terminating equipment
    3. Telecommunications grounds and related components

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1300 – Communications Backbone Cabling
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 5100 – Distributed Communications Systems
J. Section 27 6000 – Physical Security General Requirements
K. Section 27 6200 – Electronic Access Control System
L. Section 27 6400 – Video Surveillance System
M. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 0000.

2.02 CATEGORY 6 PATCH PANELS

A. Cables shall be terminated at the telecommunication closets on high-density integrated patch panels incorporating Category 6 jacks (non-keyed 8-pin), meeting the specifications for the telecommunications outlet detailed in the section above.
B. Patch panel configuration shall be 48 ports.
C. The patch panel shall exceed ANSI/TIA/EIA 568-C.2-1 Category 6 component compliance standard. All pair combinations shall be considered, with the worst-case measurement being the basis for compliance.
D. The patch panels shall be interoperable and backwards compatible to lower performing cabling systems.
E. Panels shall incorporate cable support and/or strain relief mechanisms to secure the horizontal cables at the termination block and to ensure that all manufacturers' minimum bend radius specifications are adhered to.
F. The patch panel shall have color-coded designation strips to identify cable count.
G. Manufacturers:
    1. Ortronics

2.03 CATEGORY 6A PATCH PANELS

A. Cables shall be terminated at the telecommunication closets on high-density integrated patch panels incorporating Category 6a rated jacks (non-keyed 8-pin), meeting the specifications for the telecommunications outlet detailed in the section above.
B. Patch panel configuration shall be 48 ports.
C. Wireless access points shall be installed on their own dedicated patch panel at the top of the rack.
D. The patch panel shall exceed ANSI/TIA/EIA 568-C.1 Category 6a compliance standard. All pair combinations shall be considered, with the worst-case measurement being the basis for compliance.
E. The patch panels shall be interoperable and backwards compatible to lower performing cabling systems.
F. Panels shall incorporate cable support and/or strain relief mechanisms to secure the horizontal cables at the termination block and to ensure that all manufacturers' minimum bend radius specifications are adhered to.
G. The patch panel shall have color-coded designation strips to identify cable count.
H. Manufacturers:
    1. Ortronics

2.04 VOICE BACKBONE TERMINATION FIELD

A. Wall Mounted 110 Blocks
    1. At the MDF room or the primary distribution point for voice backbone cables shall be terminated on high-density wall mounted 110 blocks.
    2. The panels shall incorporate the openings between rows to allow cables to be routed from behind the panel directly to the point of termination.
    3. The panels shall be with cable managers and covers. Termination strips on the base shall be notched and divided into 5-pair increments and accommodate C5 clips.
    4. The mechanical termination shall:
        a. Have the ability of terminating 22-26 AWG plastic insulated, solid, and stranded copper conductors.
        b. Provide a direct connection between the cable and jumper wires.
        c. Have less than 0.2-dB of attenuation from 1 - 100 MHz.
        d. Have less than 100 mw of DC resistance.
        e. Have less than 5 mw of resistance imbalance.
        f. Have minimal signal impairments at all frequencies up to 100 MHz.
    5. Blocks shall identify pair position by a color designation: blue, orange, green, brown, and slate (backbone only).

2.05 VOICE PATCH PANELS

A. At the MDF and each IDF the voice backbone cables originating from the primary distribution point shall be terminated on rack mounted voice patch panels.
B. Backbone cables 25-pair or less shall be terminated on 24-port patch panels and backbone cables greater than 25-pair shall be terminated on 48-port patch panels.
C. The voice patch panel shall utilize 25-pair Amphenol connectors on the rear and RJ-45 jacks on the front.
D. Manufacturers:
    1. Ortronics

2.06 FIBER OPTIC PATCH PANELS

A. The Contractor shall provide a fiber optic patch panel at each location where a fiber optic cable terminates.
B. All terminated fibers shall be mated to duplex LC couplings mounted on enclosed patch panels. Couplers shall be mounted on a panel that, in turn, snaps into the enclosure. The proposed enclosure shall be designed to accommodate a changing variety of connector types, including SC, ST, Fixed Shroud Duplex (e.g., “FDDI Connector”), Biconic, and FC by changing panels on which connector couplings are mounted.
C. The patch panel enclosure shall be sized to accommodate the total fiber count to be installed at each location as defined in the specifications and Drawings, including those not terminated (if applicable), PLUS 50% future growth.
D. The Contractor shall provide all required connector panels and connector couplings (sleeves, bulkheads, etc.) adequate to accommodate the number of fibers to be terminated.
E. Patch panels shall be designed for easy installation, front removal, and expansion of snap-in adapter panels.
F. Patch panels shall be enclosed assemblies affording protection to the cable subassemblies and to the terminated ends. The enclosures shall incorporate a hinged or retractable front cover designed to protect the connector couplings and fiber optic jumpers.
G. The patch panel’s enclosure shall provide for strain relief of incoming cables and shall incorporate radius control mechanisms to limit bending of the fiber to the manufacturer’s recommended minimums or 1.2”, whichever is larger.
H. Access to the inside of the patch panel enclosure during installation shall be from the front and rear. Panels that require any disassembly of the cabinet to gain entry will not be accepted.
I. All patch panels shall provide protection to both the “facilities” and “user” side of the coupling. The patch panel enclosure shall be configured to require front access only when patching. The incoming cables (backbone, riser, etc.) shall not be accessible from the patching area of the panel. The enclosure shall provide a physical barrier to access of such cables.
J. Where singlemode fibers are installed, the fibers contained in these cables may be terminated either by (1) splicing of factory-terminated cable assemblies (“pigtails”) or (2) use of a “fan-out” kit. In the latter approach, individual fibers are to be secured in a protective covering (such as an Aramid reinforced tube, for example) with connectors mated to the resulting assembly. In both instances, the proposed termination hardware shall incorporate a mechanism by which cable and subassemblies are secured to prevent damage. Splicing shall be by the “fusion” method. Individual splice loss shall not exceed 0.2 dB.
K. Fiber optic patch panels shall be Corning PCH-02 in TR/IDF and PCH-4U in MDF or Server Rooms or approved equal.
L. 50-micron LC adaptor panels shall be Corning CCH-CP12-E4 or approved equal.
M. Singlemode LC adaptor panels shall be Corning CCH-CP12-A7 or approved equal.

2.07 CABLE MANAGEMENT SYSTEM

A. The cable management system shall be used to provide a neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures. The system shall be a complete cable management system comprising 4-post and 2-post floor mount racks, wall mount racks, equipment cabinets and vertical and horizontal cable managers to manage cables on both the front and rear of the rack. The system shall protect network investment by maintaining system performance, controlling cable bend radius, and providing cable strain relief.
    1. 4-Post Equipment Racks
        a. The Contractor shall provide and install 4-post adjustable equipment racks to house cable termination components (e.g., copper data and fiber optic) and network electronics (by others) as shown on the Drawings. Prior to installation, the Contractor shall coordinate exact placement with Consultant and Owner.
        b. Rack shall be 84" in height and shall be self-supporting.
        c. Channel uprights shall be spaced to accommodate industry standard 19" mounting.
        d. Rack shall be constructed of aluminum.
        e. Rack shall be double side drilled and tapped to accept 12-24 screws. Uprights shall also be drilled on back to accept cable brackets, clamps, power strip(s), etc. Hole pattern on rack front shall be per EIA/TIA specifications (5/8"-5/8"-1/2"). Hole pattern on the rear shall be at 3" intervals to accept cable brackets.
        f. Rack shall be supplied with at least 24 spare screws.
        g. Rack shall be supplied with a vertical ground bar and #6 AWG ground lug.
        h. Manufacturers:
            1) Pentair Hoffman
    2. 4-Post Server Racks
        a. The Contractor shall provide and install 4-post adjustable server racks to house cable termination components (e.g., copper data and fiber optic), network electronics (by others) and servers as shown on the Drawings. Prior to installation, the Contractor shall coordinate exact placement with Consultant and Owner.
        b. Rack shall be 84" in height and shall be self-supporting.
        c. Channel uprights shall be spaced to accommodate industry standard 19" mounting.
        d. Rack shall be constructed of aluminum.
        e. Rack shall be double side drilled and tapped to accept square-punched .375” equipment mounting holes. Uprights shall also be drilled on back to accept cable brackets, clamps, power strip(s), etc. Hole pattern on rack front shall be per EIA/TIA specifications (5/8"-5/8"-1/2").
        f. Rack shall be supplied with at least 24 spare screws.
        g. Rack shall be supplied with ground lugs.
        h. Provide with cable waterfall and vertical cable managers
        i. Contractor shall provide 100 cage nuts and screws with each rack.
        j. Manufacturers:
            1) Pentair Hoffman
    3. 2-Post Equipment Racks
        a. The Contractor shall provide and install 2-post adjustable equipment racks to house cable termination components (e.g., copper data and fiber optic) and network electronics (by others) as shown on the drawings. Prior to installation, the Contractor shall coordinate exact placement with Owner.
        b. Rack shall be 84" in height and shall be self-supporting.
        c. Channel uprights shall be spaced to accommodate industry standard 19" mounting and have pass-through holes with smooth edges to protect cables.
        d. Rack shall be constructed of aluminum.
        e. Able to support up to 1,500 pounds.

f. Rack shall be double side drilled and tapped to accept 12-24 screws. Uprights shall also be drilled on back to accept cable brackets, clamps, power strip(s), etc. Hole pattern on rack front shall be per EIA/TIA specifications (5/8"-5/8"-1/2"). Hole pattern on the rear shall be at 3" intervals to accept cable brackets.
g. Rack shall be supplied with at least 24 spare screws.
h. Rack shall be supplied with a vertical ground bar and #6 AWG ground lug.
i. Manufacturers:
    1) Pentair Hoffman

B. Vertical Cable Management
1. At the telecommunication rooms, vertical cable management shall be furnished and installed to adjacent racks to organize cables on front and rear of telecommunication racks.
2. Vertical cable managers shall include components that aid in routing, managing, and organizing cable to and from equipment. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief. Panels shall be a universal design mounting to EIA 19" or 23" racks.
3. Vertical cable management system shall feature the following:
    a. Open cabling section on the rear that provides easy access and routes cable bundles feeding into the back of patch panels and 1 RMU cable guide on the front designed for fanning and managing patch cords.
    b. Edge-protected pass-through ports designed for easy routing of cable from front channel to back.
    c. Vertical slots along the center separator to allow securing cable bundles neatly with management straps.
    d. Door/cover (front only) that is easily opened from the right or left and still easily removed to allow for quick moves, adds, and changes.
    e. Movable wire retainers to retain the cables during cover removal.
4. Vertical cable management at the end of rack rows shall be 6”.
5. Vertical cable management between racks shall be 10”

2.08 POWER DEVICES

A. Refer to Section 27 0000 for additional requirements.
B. Horizontal PDU, Single Circuit
1. Power strip shall provide 3,840 joules of surge protection.
2. 40-80db of EMI/RFI power conditioning
3. Contractor shall provide one (1) power strip per rack/cabinet.
4. Power strip shall be rated for 20 amps.
5. Manufacturer:
    a. Hoffman DP1N191020S

C. Vertical PDU, Dual Circuit
1. Contractor shall provide one (1) power strip per server rack/cabinet.
2. Dual NEMA L5-20R or 5-20R (with included adapter) receptacle connections.
3. Single-Phase, Dual 20A Circuits, 3.8kW
4. 16 color coded outlets per circuit
5. Dual digital meters displaying amps.
6. Provide with appropriate rack mounting hardware.
7. Manufacturer:
    a. Pentair Hoffman DP1N622420MT with adaptor cord for 5-20 plug

2.09 SHALLOW WALL MOUNT CABINET

A. Where Indicated on Project Drawings, the Contractor shall provide and install a shallow wall mount cabinet to house cable termination panels and network electronics. The Contractor shall also provide and install ¾" plywood backboard for support when mounting cabinet.

B. The Contractor shall coordinate with General Contractor to install power outlet into cabinet.
C. Cabinets housing active equipment shall be equipped with a fan and fan controller.
D. Manufacturers:
    1. Pentair Hoffman

2.10 WALL MOUNT EQUIPMENT CABINET

A. Where indicated on Project Drawings, the Contractor shall provide and install wall mount cabinet to house cable termination panels and network electronics. The Contractor shall also provide and install one (1) ¾" plywood backboard for support when mounting cabinet.
B. The Contractor shall coordinate with Electrical Contractor to install a power outlet into cabinet.
C. Cabinets shall be equipped with fans and thermostatic fan controller.
D. Manufacturers:
    1. Pentair Hoffman

2.11 HORIZONTAL CABLE MANAGEMENT

A. Horizontal cable managers shall include components that aid in routing, managing, and organizing cable to and from equipment. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief. Panels shall be a universal design mounting to EIA 19" racks and constructed of steel bases with PVC duct attached. The duct fingers shall include retaining tabs to retain the cables in place during cover removal. The covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
B. The cable managers shall be provided with movable wire retainers to retain the cables during cover removal and #12-24 mounting screws. An integral strain relief bracket shall be provided on either end of the duct to allow for easy cover placement.
C. Double-Sided horizontal cable managers shall be placed above and below each patch panel.
D. The Contractor shall also supply (1) per 48-port patch panel additional managers for network electronics.
E. Manufacturers:
    1. Pentair Hoffman

2.12 TELECOMMUNICATION GROUND

A. The Telecommunication Contractor is responsible for providing an appropriate ground for all racks, trays, and telecommunications equipment installed by this Contractor. Refer to the Grounding and Bonding for Technology Systems specification section.

2.13 WIRE BASKET RUNWAY TRAY

A. Within each Telecommunications Room, the Contractor shall provide and install sufficient wire basket tray to support cable bundles from corridor to equipment racks or as shown on the Project Drawings, this Contractor shall provide and install sufficient basket tray to support cable bundles from corridor to equipment racks or cabinets.
B. The Contractor shall provide all necessary labor, supervision, materials, equipment, tests, and services to install complete wire basket runway systems in the telecommunication closet.
C. Wire basket runway systems shall include, but are not limited to, straight sections of continuous wire mesh, field formed horizontal and vertical bends, tees, drop outs, supports, and accessories.
D. Specifications and Drawings are for assistance and guidance, but exact routing, locations, distances, and levels will be governed by actual field conditions.
E. All straight section longitudinal wires shall be straight (with no bends).
F. Wire basket runway shall be made of high strength steel wires and formed into a standard 2-inch by 4-inch wire mesh pattern with intersecting wires welded together. All

wire ends along runway sides (flanges) shall be rounded during manufacturing for safety of cables and installers.

G. All fittings shall be field formed as needed.
H. All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 stainless steel. Splicing assemblies shall provide a continuous ground connection.
I. Wire Basket Tray shall be grounded to a Telecommunications Room ground bus bar.
J. Cable Drop Out/Waterfall
    1. Where cables bundles transition from tray and drop to the rack, cabinets or ladder rack, the Contractor shall provide and install a radius control device. This device shall be a waterfall or drop out device and shall be properly sized to accommodate cable bundle plus 20% future growth.
K. T-sections of tray shall be made using T-section fittings.
L. Straight section splices shall be made using splice plates.
M. Wire basket runway supports shall be wall mounted brackets and trapeze hangers when spanning the room.
N. Trapeze hangers shall be supported by 3/8 inch diameter rods.
O. Provide size as indicated on the drawings.
P. Tray shall have flat Black finish.
Q. Accessories (connectors, splice plates…) shall be painted to match tray finish.
R. Manufacturer:
    1. Legrand Cablofil
    2. Or approved Dallas ISD equal

2.14 LADDER RACK

A. Within each Telecommunications Room, the Contractor shall provide and install ladder rack as shown on the Project Drawings.
B. Within each Telecommunications Room with a vertical conduit riser the Contractor shall provide and install vertical ladder rack connecting the ground conduit sleeve penetrations with the ceiling conduit sleeve penetrations.
C. The Contractor shall provide all necessary labor, supervision, materials, equipment, tests, and services to install a complete ladder rack system in the telecommunications room as shown on the Drawings.
D. Specifications and Drawings are for assistance and guidance, but exact routing, locations, distances, and levels will be governed by actual field conditions.
E. All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 stainless steel.
F. Cable Drop Out/Waterfall
    1. Where cables bundles transition from tray and drop into the racks/cabinets, the Contractor shall provide and install a radius control device. This device shall be a waterfall or drop out device and shall be properly sized to accommodate cable bundle plus 20% future growth.
G. Size ladder rack as indicated on the Contract Documents.
H. Accessories (connectors, splice plates…) shall be painted to match tray finish.
I. Manufacturers:
    1. Pentair Hoffman

2.15 PLYWOOD

A. The Contractor shall provide plywood. Plywood shall be installed on all walls within a telecommunications room and other locations as noted.
B. Provide void-free, interior grade, fire rated A-C grade plywood, 3/4” by 48” by 96”, or as indicated.

C. When plywood is required to be painted, the paint shall be UL 723 rated white or gray fire retardant. The plywood's rating stamp shall be exposed (not painted over) on each sheet. Plywood shall have fire calk around all edges. Provide label including paint manufacturer, date painted, UL listing and name of Installer
D. Plywood shall be mounted vertically starting at 22" AFF to 118" AFF and anchored to all studs.

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.02 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.03 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.04 EQUIPMENT RACK AND CABINETS

A. Prior to permanently securing racks or cabinets, the Contractor shall coordinate a walk through with the Owner to determine exact placement of racks.
B. The Contractor shall bolt the rack to the floor as recommended by the manufacturer. Multiple racks shall be joined and the ground made common on each. Rack shall also be stabilized by extending a brace extending to the wall. Alternately, overhead cable tray over which the cabling accesses the equipment rack(s) shall provide this function.
C. A space between the rack upright and the wall (~6") shall be planned to allow for cabling in that area. The rear of the rack shall be ~40" from the wall to allow for access by maintenance personnel. In all cases, a minimum of 40" workspace in front of the rack is also required. Locations where these guidelines cannot be followed shall be brought to the attention of the Consultant for resolution prior to installation.
D. All hardware and equipment is to be mounted at least 18" above floor level. This is to afford easy access and, in the case of the lower limit, prevent damage to the components. Positioning of hardware shall be reviewed and approved by the Consultant and Site Coordinator(s) prior to installation.
E. Equipment rack shall be equipped with cable management hardware to allow an orderly and secure routing of twisted pair cabling to the data patch panels. At minimum, one such horizontal jumper management panel shall be placed below each fiber optic patch panel installed by the Contractor. Additional jumper management panels may be required pending installation of other cable types on the rack. The rack shall be grounded to the telecommunications grounding backbone (TGB) using a #6 AWG (or larger) insulated stranded copper conductor (GREEN jacket).

3.05 WIRE BASKET TRAY AND LADDER RACK RUNWAY

A. Runway shall be installed in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of NEC, applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.
B. Coordinate installation of runway with other electrical work as necessary to properly interface installation of wire basket runway with other work.
C. Provide sufficient space encompassing runways to permit access for installing and maintaining cables.
D. Test runways to ensure electrical continuity of bonding and grounding connections and to demonstrate compliance with specified maximum grounding resistance.

END OF SECTION

SECTION 27 1300
COMMUNICATIONS BACKBONE CABLING

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 00 00 for additional project scope information.
B. This section describes the products and execution requirements relating to telecommunications voice, data and video backbone cabling and termination components.
C. Backbone Cabling is the cable and hardware interconnecting telecommunication rooms (TRs), building demarcation rooms, equipment rooms and server rooms. The backbone cabling shall consist of the following cable types:
    1. 50-micron Multimode Fiber Optic Cable
    2. Multi-Pair Copper Voice Backbone Cable

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1100 – Communications Equipment Rooms
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 2100 – Network Electronics and UPS Systems

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 00 00 for additional requirements.

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.09 TEST DATA – FIBER OPTIC MEDIA

A. The test result information for each link shall be recorded in the memory of the field tester upon completion of the test.
B. The test result records saved by the tester shall be transferred into a Windows-based database utility that allows for the maintenance, inspection, and archiving of these test records. A guarantee shall be made that these results are transferred to the PC unaltered, i.e., “as saved in the tester” at the end of each test.
C. The database for the completed job shall be stored and delivered on a digital storage medium. This medium shall include the software tools required to view, inspect, and print any selection of test reports.

D. A paper copy of the test results shall be provided that lists all the links that have been tested with the following summary information:
    1. The identification of the link in accordance with the naming convention defined in the overall system documentation.
    2. The overall Pass/Fail evaluation of the link-under-test including the Attenuation worst-case margin (margin is defined as the difference between the measured value and the test limit value as defined in this document).
    3. The date and time the test results were saved in the memory of the tester.
E. The following general information is to be provided in the electronic database containing the test result information for each link:
    1. The identification of the customer site as specified by the end user.
    2. The overall Pass/Fail evaluation of the link-under-test.
    3. The name of the standard selected to execute the stored test results.
    4. The cable type and the value of the 'index of refraction' used for length calculations.
    5. The date and time the test results were saved in the memory of the tester.
    6. The brand name, model, and serial number of the tester.
    7. The revision of the tester software and the revision of the test standards database in the tester.
F. The detailed test results data to be provided in the electronic database for each tested optical fiber shall contain the following information:
    1. The identification of the link/fiber in accordance with the naming convention defined in the overall system documentation.
    2. The insertion loss (attenuation) measured at each wavelength, the test limit calculated for the corresponding wavelength, and the margin (difference between the measured attenuation and the test limit value).
G. The link length shall be reported for each optical fiber for which the test limit was calculated.
H. Contractor shall provide accurate as-built Construction Drawings at the site during construction.
I. The Drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (".dwg", AutoCAD rel. 2018 and ".dxf") formats on which as-built construction information can be added. These documents will be modified accordingly by the Contractor to denote as-built information as defined above and returned to the Owner.
J. The Contractors shall annotate the base Drawings and return to the Consultant in hard copy (same plot size as originals) and electronic (AutoCAD rel. 2018 and ".dxf") form.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 0000.

2.02 BACKBONE VOICE CABLING

A. The voice backbone cable shall link the Main Closet and Telecommunications Rooms serving the building. The cables shall be CMP rated where required.
B. Voice backbone cable shall incorporate 24 AWG solid annealed copper conductors insulated with a polyvinyl chloride skin over expanded polyethylene. Conductors shall be twisted to form pairs and fully color-coded.
C. The voice backbone cable shall be sized as detailed on the Drawings.

D. Conductors shall be identified by the insulation color of each conductor. The color code shall follow the industry standard composed of ten (10) distinctive colors to identify 25 pairs in accordance with ICEA publication S-80-576-1988. Marking of each mate of the primary conductor in a pair with the color of that primary conductor is optional.
E. The voice backbone cable shall meet or exceed the EIA/TIA Category 3 performance requirements.
F. When cables of larger than 25 pairs are required, the core shall be assembled into 25-pair subunits, each color-coded in accordance with ICEA publication S-80-576-1988. Cables with over 600 pairs shall have 25-pair binder groups combined into super units. These super units shall be wrapped with a solid color thread that follows the primary color scheme of white, red, black, yellow, and violet. Binder color code integrity shall be maintained wherever cables are spliced.
G. All cables and equipment shall be furnished, installed, wired, and tested by the Contractor.
H. Manufacturers:
    1. Superior Essex

2.03 TIGHT-BUFFERED OPTICAL FIBER CABLES FOR INDOOR DISTRIBUTION APPLICATIONS

A. General Considerations
    1. The cable shall meet the requirements of the National Electrical Code (NEC) Section 770.
    2. For plenum applications, the cable shall meet applicable flame tests: ANSI/UL 910 (NFPA 262-1994).
    3. Finished cables shall conform to the applicable performance requirements of Tables 8-6 and 8-7 of the Insulated Cable Consultants Association, Inc. (ICEA) *Standard for Fiber Optic Premises Distribution Cable* (ICEA S-83-596).
B. Cable Construction
    1. The coated fiber shall have a layer of Teflon placed between the acrylate coating of the optical fiber and the thermoplastic buffer. The diameter of the thermoplastic buffer coating shall be 900 ±50µm. The fiber coating and buffer shall be removable with commercially available stripping tools in a single pass for connectorization or splicing.
    2. Cables with 2 to 24 fibers layered aramid yarns shall serve as the tensile strength member of the cable.
    3. A ripcord shall be applied between the aramid yarns and the outer jacket to facilitate jacket removal.
    4. The outer jacket shall be extruded over the aramid yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.
    5. The fibers shall be stranded around a dielectric central member.
    6. For cables containing 12-24 fibers, the fibers shall be arranged in two layers.
    7. The central member shall be over coated with a thermoplastic, when required, to achieve dimensional sizing to accommodate and support the 900 µm buffered fibers.
    8. Cables with 24 to 60 fibers shall have unitized riser and plenum constructions.
    9. The buffered fibers shall be grouped in six-fiber subunits.
    10. The fibers shall be stranded around a dielectric central member in the subunit.
    11. Layered aramid yarns shall serve as the tensile strength member of the subunit.
    12. A ripcord may be applied between the aramid yarns and the subunit jacket to facilitate jacket removal.
    13. The subunit jacket shall be extruded over the aramid yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits,

blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.

14. The subunits shall be stranded around a dielectric central member. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. The outer jacket shall be extruded around the subunits. The strength members shall be of a high modulus aramid yarn. The aramid yarns shall be helically stranded around the buffered fibers. Non-toxic, non-irritant talc shall be applied to the yarns to allow them to be easily separated from the fibers and the subunit jacket.

C. Outer Cable Jacket

1. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand stresses. The nominal thickness of the cable outer jacket shall be sufficient to provide adequate cable protection while meeting the mechanical, flammability, and environmental test requirements of this document over the life of the cable.
2. The indoor distribution cable specified herein shall have an interlocking armor made of steel or aluminum. Provide plenum rated cable as required.
3. The indoor distribution cable specified herein shall be non-conductive. Provide plenum rated cable as required.
4. The color of the jacket shall match the jacket color of the optical fiber cable located inside of the cable.

D. Fiber Identification

1. The individual fibers shall be color-coded for identification. The optical fiber color-coding shall be in accordance with ANSITIA/EIA-598-B “Optical Fiber Cable Color Coding.” The coloring material shall be stable over the temperature range of the cable, shall not be susceptible to migration, and shall not affect the transmission characteristics of the optical fibers. Color-coded buffered fibers shall not adhere to one another.
2. When buffered fibers are grouped into individual subunits, each subunit jacket shall be numbered for identification, with the exception of filler subunits where used. The number shall be repeated at regular intervals. The subunit jacket color shall be aqua for subunits containing OM3/4 multimode fibers, yellow for subunits containing singlemode fibers, and white for filler subunits.
3. The outer jacket for all dielectric cable shall be marked with the manufacturer name or UL file number, date of manufacture, fiber type, flame rating, listing symbol, and sequential length markings every two feet. The marking shall be in contrasting color to the cable jacket. The cable jacket color shall be Aqua for cables containing OM3/4 multimode fibers and yellow for cables containing singlemode fibers.
4. Cables shall be marked with the manufacturer name, date of manufacture, fiber type, flame rating, listing symbol, and sequential length markings every two feet. The marking shall be in contrasting color to the cable jacket. The cable jacket color shall match the color of the core optical fiber cable.

E. Cable Specifications

1. Temperature Range
   a. Non-Plenum Applications: The storage temperature range for the cable on the original shipping reel shall be -40 to +70ºC. The installation/operating temperature range for riser cables shall be -20 to +70 ºC. Testing shall be in accordance with FOTP-3.
   b. Plenum Applications: The storage temperature range for the cable on the original shipping reel shall be -40 to +70ºC.The installation/operating

temperature range for plenum cables shall be 0 to +70ºC.Testing shall be in accordance with FOTP-3.

2. Compressive Load Resistance
    a. When tested in accordance with FOTP-41, Compressive Loading Resistance of Fiber Optic Cables, the cable shall withstand a minimum compressive load of 89 N/cm (50 lbf/in) applied uniformly over the length of the compression plate. While under compressive load, the fiber shall not experience an attenuation change greater than 0.4 dB at 1550 nm (singlemode) or greater than 0.6 dB at 1300 nm (multimode). After the compressive load is removed, the fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (singlemode) or greater than 0.4 dB at 1300 nm (multimode).
3. Cyclic Flexing
    a. When tested in accordance with FOTP-104, Fiber Optic Cable Cyclic Flexing Test, the cable shall withstand 25 mechanical flexing cycles at a rate of 30 ± 1 cycle per minute. The fiber shall not experience an attenuation change greater than 0.2 dB at 1550 nm (singlemode) or greater than 0.4 dB at 1300 nm (multimode).
4. High and Low Temperature Bend
    a. When tested in accordance with FOTP-37, Fiber Optic Cable Bend Test, Low and High Temperature, the cable shall withstand four full turns around a mandrel at test temperatures of 0 ºC and +50 ºC. The fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (singlemode) or greater than 0.5 dB at 1300 nm (multimode).
5. Impact Resistance
    a. When tested in accordance with FOTP-25, Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies, the cable shall withstand a minimum of 20 impact cycles for riser cables and 10 impact cycles for plenum cables. The fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (singlemode) or greater than 0.4 dB at 1300 nm (multimode).
6. Temperature Cycling
    a. When tested in accordance with FOTP-3, Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components, the change in attenuation at extreme operational temperatures (0 to +50 ºC) shall not exceed 0.3 dB/km at 1550 nm (singlemode) or 0.6 dB/km at 1300 nm (multimode). The change in attenuation is measured with respect to the baseline values measured at room temperature before temperature cycling.
7. Twist-Bend
    a. When tested in accordance with FOTP-91, Fiber Optic Cable Twist-Bend Test, a length of cable no greater than 2 meters shall withstand 10 cycles of mechanical twisting and bending around a mandrel 20 times the cable outer diameter. The fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (singlemode) or 0.4 dB at 1300 nm (multimode).

F. Multimode OM4 (50/125 µm)
1. The multimode fiber utilized in the optical fiber cable shall meet EIA/TIA-492AAAA-A-1997, Detail Specification for 50µm Core Diameter/125µm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers, unless noted otherwise. Cable shall have the following specifications:
    a. Core Diameter: 50 ± 3 µm
    b. Core Non-Circularity: ≤5%
    c. Cladding Diameter: 125± 2 µm
    d. Cladding Non-Circularity: <2.0%
    e. Core-to-Cladding Concentricity: ≤ 3 µm
    f. Coating Diameter: 245 ± 2 mm
    g. Refractive Index Profile: Graded index

h. Numerical Aperture: 0.275 ± 0.015
i. Maximum Attenuation: less than 3.0 dB/km at 850 nm and 1.0 dB/km at 1300 nm.

2. IEEE 802.3ae Performance: The fiber shall support laser-based 10 Gigabit Ethernet (10GbE) operation for up to 550 meters.
3. Attenuation at the Water Peak: The attenuation coefficient at 1380 nm shall not exceed the attenuation coefficient at 1300 nm by more than 1.0 dB/km.
4. Macrobend Attenuation: The attenuation due to 100 turns of fiber around a 75-± 2 mm diameter mandrel shall not exceed 0.5 dB at 850 nm or 1300 nm.

G. The cable shall be manufactured by:
1. Superior Essex ArmorTex Series GIGAlite-10, GIGAlite 10XB

2.04 FIBER OPTIC CONNECTORS

A. The MM optical connector shall be LC UPC type.
B. The connector ferrule shall be ceramic or glass-in-ceramic. The optical fiber within the connector ferrule shall be secured with an adhesive.
C. The attenuation per mated pair shall not exceed 0.35 dB (individual) and 0.2 dB (average). Connectors shall sustain a minimum of 200 mating cycles per EIA/TIA-455-21 without violating specifications.
D. The connector shall meet the following performance criteria:
1. Cable Retention (FOTP-6) 0.2 dB
2. Durability (FOTP-21) 0.2 dB
3. Impact (FOTP-2) 0.2 dB
4. Thermal Shock (FOTP-3) 0.2 dB
5. Humidity (FOTP-5) 0.2 dB

E. Connectors shall be field terminated and polished or fusion spliced. Mechanical, quick connect or index-gel based connectors are not allowed.
F. Manufacturer:
1. Ortronics

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.
B. Field Test Requirements for Fiber Optic Cabling System
1. The fibers utilized in the installed cable shall be traceable to the manufacturer. Upon request by the Owner, the Contractor shall provide cable manufacturer's test report for each reel of cable provided. These test reports shall include the manufacturers on reel attenuation test results at 850-nm and 1300-nm for each optical fiber of each reel prior to shipment from the manufacturer.
2. Factory data shall be provided upon request, showing on-the-reel bandwidth performance results as tested at the factory.
3. Every fiber optic backbone link in the installation shall be tested in accordance with the field test specifications defined by the Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568-C or by the appropriate network application standard(s), whichever is more demanding.
4. The test shall include the representative connector performance at the connecting hardware associated with the mating of patch cords. The test does not, however, include the performance of the connector at the interface with the test equipment.
5. 100% of the installed cabling links shall be tested and shall pass the requirements of the standards mentioned above and as further detailed in this document. Any failing link shall be diagnosed and corrected at no additional cost to the Owner. 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 RFP.

6. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
   a. The manufacturer of the fiber optic cable and/or the fiber optic connectors
   b. The manufacturer of the test equipment used for the field certification
   c. Training organizations authorized by BICSI
7. Field test instruments for multimode fiber cabling shall meet the requirements of ANSI/TIA/EIA-526-14-A. The light source shall meet the launch requirements of ANSI/EIA/TIA-455-50B, Method A. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap (as described in clause 11 of ANSI/TIA/EIA-568-C.1) with a Category 1 light source.
8. Field test instruments for singlemode fiber cabling shall meet the requirements of ANSI/EIA/TIA-526-7.
9. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
10. The fiber optic launch cables and adapters shall be of high quality and the cables shall not show excessive wear resulting from repetitive coiling and storing of the tester interface adapters.
11. The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests.
12. Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter.
13. A representative of the Owner shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase five business days before testing begins.
14. A representative of the Owner will select a random sample of 5% of the installed links. The results obtained shall be compared to the data provided by the installation Contractor. If more than 2% of the sample results differ in terms of the Pass/Fail determination, the installation Contractor, under supervision of the Owner representative, shall repeat 100% of the testing. The cost of retesting shall be borne by the installation Contractor.

C. Fiber Performance Test Parameters

1. The link attenuation shall be calculated by the following formulas specified in ANSI/TIA/EIA standard 568-B.
   a. Link Attenuation = Cable_Attn + Connector_Attn + Splice_Attn
   b. Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)
   c. The values for the Attenuation_Coefficient are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation_Coefficient (dB/km)
Multimode OM4 50/125 µm	850	3.0
	1300	1.5

   d. Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
   e. Maximum allowable mated connectors_loss = 0.50 dB
   f. Splice_Attn (dB) = number of splices (S) * splice_loss (dB)
   g. Maximum allowable splice_loss = 0.1 dB (when tested bidirectionally)
2. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices—i.e., it does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
3. Test equipment that measures the link length and automatically calculates the link loss based on the above formulas is preferred.

4. The above link test limits attenuation are based on the use of the One Reference Jumper Method specified by ANSI/TIA/EIA-526-14A, Method B and ANSI/TIA/EIA-526-7, Method A.1. The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.
5. The backbone link (multimode/singlemode) shall be tested in two directions at both operating wavelengths to account for attenuation deltas associated with wavelength.
6. Multimode backbone links shall be tested at 850 nm and 1300 nm in accordance with ANSI/EIA/TIA-526-14A.
7. Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation shall be used to determine limit (acceptance) values.
8. Multimode backbone links are designed to be used with network applications that use laser light sources (underfilled launch conditions). However, the link attenuation equation has been based upon the use of a light source categorized as Category 1, Overfilled.
9. Singlemode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1. All singlemode links shall be certified with test tools using laser light sources at 1310 nm and 1550 nm.

3.02 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.03 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.04 FIBER OPTIC CABLE INSTALLATION REQUIREMENTS

A. Cable slack shall be provided in each backbone fiber optic cable. This slack is exclusive of the length of fiber that is required to accommodate termination requirements and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored in a fashion as to protect it from damage and be secured in the termination enclosure or a separate enclosure designed for this purpose. Multiple cables may share a common enclosure.
B. A minimum of 15 feet of slack cable (each cable) shall be coiled and secured at each end.

END OF SECTION

SECTION 27 1500
COMMUNICATIONS HORIZONTAL CABLING

PART 1 GENERAL

1.01 SCOPE

A. This section describes the products and execution requirements relating to telecommunications voice, data and video horizontal (station) cabling and termination components.
B. Horizontal cabling is the cabling between the work area telecommunications outlet and the telecommunications room (TR). Horizontal cabling is often referred to as “station cabling”.
C. Station cabling shall not exceed 250’ as directed by the Owner. Please refer to article 3.05 of this specification for more information.
D. The horizontal cabling system will consist of the following:
    1. Unshielded Twisted Pair (UTP) Cable
    2. Outlet Termination Modules (jacks)
    3. Outlet Termination Plates
    4. Above Ceiling Cable Support Systems
    5. Horizontal Cable Testing Requirements
    6. Cable Pathway/Sleeve Requirements

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1100 – Communications Equipment Rooms
F. Section 27 1300 – Communications Backbone Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 3000 – Voice Communications
J. Section 27 4000 – AV/Multimedia General Requirements
K. Section 27 4100 – Audio Visual Systems
L. Section 27 5100 – Distributed Communications Systems
M. Section 27 6000 – Physical Security General Requirements
N. Section 27 6200 – Electronic Access Control System
O. Section 27 6400 – Video Surveillance System
P. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 0000.

2.02 CATEGORY 6 HORIZONTAL COPPER CABLES

A. All cables and equipment shall be furnished, tested, installed and wired by the Contractor.
B. All horizontal data cables shall terminate on modular patch panels in the telecommunications closet as specified on the Drawings.
C. This specification defines the requirements for commercially available high performance Category 6 cable.
D. This cable shall be suitable for installation free-air, in building risers, in conduit, and/or in cable tray and shall carry CMP rating.
E. The cable design described herein shall exceed transmission performance of Category 6 cables.
F. Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code, and meet the specifications of NEMA (low loss), UL 444, and ICEA. Conductor shall also conform to the requirements for solid annealed copper wire in accordance with ASTM B 3.
G. All cables, termination components, and support hardware shall be furnished, tested, installed, and wired by the Contractor.
H. The jacket color for data cables shall be the following:
    1. YELLOW – Standard Data
    2. PINK – Security Cameras
I. IMPORTANT: Cable and termination components (jack, patch panel, wiring blocks) are specified to function as a system. The compatibility of the cable to be installed with the proposed termination components shall be recognized and documented by the termination component manufacturer.
J. Manufacturers:
    1. Superior Essex

2.03 CATEGORY 6A HORIZONTAL COPPER CABLES

A. All cables and equipment shall be furnished, tested, installed and wired by the Contractor.
B. All horizontal data cables shall terminate on modular patch panels in the telecommunications closet as specified on the Drawings.
C. All wireless access points shall utilize Category 6a cable unless noted otherwise.
D. This cable shall be suitable for installation free-air, in building risers, in conduit, and/or in cable tray and shall carry CMP rating.
E. The cable design described herein shall exceed transmission performance of Category 6a cables.
F. Category 6a cables shall be bundled separately from lower Category rated cabling.
G. Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code, and meet the specifications of NEMA (low loss), UL 444, and ICEA. Conductor shall also conform to the requirements for solid annealed copper wire in accordance with ASTM B 3.
H. All cables, termination components, and support hardware shall be furnished, tested, installed, and wired by the Contractor.
I. The jacket color for data cables shall be the following:

1. BLUE – Wireless Access Points (non-Erate)
2. GREEN – Wireless Access Points (Erate)

J. IMPORTANT: Cable and termination components (jack, patch panel, wiring blocks) are specified to function as a system. The compatibility of the cable to be installed with the proposed termination components shall be recognized and documented by the termination component manufacturer.

K. Manufacturers:

1. Superior Essex

2.04 INFORMATION OUTLET

A. General

1. Station cables shall each be terminated at their designated workstation location in the connector types described in the subsections below. Included are modular jacks, faceplates, and surface mount raceway. The combined assembly is referred to as the Standard Information Outlet (SIO). These connector assemblies shall snap into a mounting frame.
2. SIOs shall be mounted in new outlet boxes, where existing boxes are in place, on surface mount raceway typically in surface raceway with barrier, in floor mount interface boxes, or on power poles either currently owned or new.
3. The telecommunications outlet frame shall accommodate or incorporate the following:
   a. A minimum of four (4) modular jacks, when installed on a wall-mounted assembly.
   b. A mechanism for adjusting the surface plate to a plumb position.
4. When multiple jacks are identified in close proximity on the Drawings. The Contractor shall determine the optimum compliant configuration based on the products proposed.
5. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the Contractor shall submit the proposed configuration for each SIO type for review by the Consultant.

B. Modular Jack

1. Data jacks shall be non-keyed 8-pin modular jacks.
2. Termination components shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
3. Jacks shall utilize a four-layer printed circuit board to control NEXT.
4. Jack housings shall fully encase and protect printed circuit boards and IDC fields.
5. Modular jack contacts shall accept 2500 plug insertions.
6. Modular jack contacts shall be formed flat for increased surface contact with mated plugs. These contacts shall be arranged on the PC board in two staggered arrays of four to maximize contact spacing and minimize crosstalk.
7. Modular jack contacts shall be constructed of Beryllium copper for maximum spring force and resilience.
8. Contact Plating shall be a minimum of 50 micro inches of gold in the contact area over 50 micro-inch of nickel, compliant with FCC part 68.5.
9. Jack termination shall be 110 IDC, integral to the jack housing, laid out in two arrays of four contacts.
10. Jacks shall utilize a paired punch down sequence. Cable pairs shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
11. Jacks shall utilize tin lead plated (60% tin/40%lead) phosphor bronze 110 insulation displacement contacts.
12. Jacks shall terminate 22-26 AWG stranded or solid conductors.
13. Jacks shall terminate insulated conductors with outside diameters up to .050".
14. Jacks shall be compatible with single conductor 110 impact termination tools.

15. Jacks shall be compatible with EIA/TIA 606 color code labeling and accept snap on icons for identification or designation of applications.
16. Category 6 jacks shall be the following color:
    a. YELLOW – Standard Data
    b. PINK – Security Cameras
17. Category 6A jacks shall be the following color:
    a. BLUE – Wireless Access Points (non-Erate)
    b. GREEN – Wireless Access Points (Erate)
18. Jacks shall be marked as either T568A or T568B wiring.
19. Category 6 jacks shall be manufactured by:
    a. Ortronics Series II
20. Category 6a jacks shall be manufactured by:
    a. Ortronics Series II

C. Outlet Faceplates
1. Faceplates shall match the electrical outlets for material type and color.
2. Faceplates shall incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.
3. Any unused jack positions shall be fitted with a removable blank inserted into the opening.
4. Modular jacks shall have capability to incorporate a dust cover that fits over and/or into the jack opening. The dust cover shall be designed to remain with the jack assembly when the jack is in use. No damage to the jack pinning shall result from insertion or removal of these covers. Dust covers that result in deformation of the jack pinning shall not be accepted.
5. Wall-mounted “voice only” outlets shall be installed where identified on the floor plan Drawings to accommodate wall-mounted telephone sets. The wall plate shall be of stainless steel construction, accommodate one RJ-45 jack, mount on a standard single gang outlet box or bracket, and include mating lugs for wall phone mounting.
6. All standard information outlets and the associated jacks shall be of the same manufacturer throughout each/the building. An allowable exception, however, is the wall-mounted “voice only” outlet described above.
7. Faceplates shall be manufactured by modular jack manufacturer.

D. Surface Mount Interface Box
1. Low profile, surface mount boxes shall incorporate recessed designation strips at the top for identifying labels. Designation strips shall be fitted with clear plastic covers.
2. The box shall feature built-in cable management for both fiber and copper applications.
3. Any unused jack positions shall be fitted with a removable blank inserted into the opening.
4. Modular jacks shall have capability to incorporate spring-loaded shutter door for added protection from dust and other airborne contaminants. The dust cover shall be designed to remain with the jack assembly when the jack is in use.
5. The box shall have the capability to incorporate optional magnets that can be internally mounted.
6. Surface mount box shall be manufactured by modular jack manufacturer.

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.02 TWISTED PAIR TEST EQUIPMENT

A. Test equipment used under this contract shall be from a manufacturer who has a minimum of five years' experience in producing field test equipment. Manufacturers shall be ISO 9001 certified.
B. All test tools of a given type shall be from the same manufacturer and have compatible electronic results output. Test adapter cable shall be approved by the manufacturer of the test equipment. Baseline accuracy of the test equipment shall exceed TIA Level III, as indicated by independent laboratory testing.
C. Test equipment shall:
    1. Be capable of certifying Category 5E, 6 and 6A permanent links.
    2. Have a dynamic range of at least 100dB to minimized measurement uncertainty.
    3. Be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
    4. Include S-band time domain diagnostics for NEXT and return loss.
    5. Be capable of running individual NEXT, return loss, etc., measurements in addition to AutoText.
    6. Include a library of cable types, stored by major manufacturer.
    7. Store at least 1000 Category 5e, 6 or 6A autotests in internal memory.
D. The measurement reference plane of the test equipment shall start immediately at the output of the test equipment interface connector. There shall not be a time domain dead zone of any distance that excludes any part of the link from the measurements.
E. The approved manufacturer of the test equipment is Fluke and JDSU/Viavi.

3.03 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.04 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.05 STATION CABLING

A. Information outlet cables with copper media (voice & data UTP and "TV" coax) shall be located as detailed on the Project Drawings.
B. The Contractor shall utilize these documents in determining materials quantities and routing.
C. Station cables shall be run to the information outlet from the telecommunications room serving each area in conduit, free-air above drop ceiling, in cable tray, and/or in modular furniture.
D. The maximum station cable drop length for UTP cables shall not exceed 250 feet in order to meet data communications performance specifications. This length is measured from the termination panel in the wiring closet to the outlet and shall include any slack required for the installation and termination. The Contractor shall install station cabling in a fashion to avoid unnecessarily long runs.
E. Contractor shall verify cable lengths comply with published standards; prior to installation of any horizontal cabling, this Contractor shall verify cable paths and confirm no horizontal cable will exceed 250 total feet. If it is determined that the cable will exceed 250', this Contractor shall route the cabling to another telecommunications room or determine shorter path so cables are under 250'. If this is not possible, the Contractor shall notify the Consultant prior to installation so a new IDF location may be coordinated.
F. If, upon testing the installed cabling exceeds the allowed 250', the Contractor shall provide a new IDF within 250' of the affected outlets and shall replace the non-compliant cables with new cabling to the new IDF, all at no additional cost to the Owner. The new IDF shall meet all Owner standards outline in these specifications.
G. All cables shall be installed splice-free unless otherwise specified.
H. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as the feed cable and operate pulling machinery.

I. Avoid abrasion and other damage to cables during installation.
J. All cable shall be free of tension at both ends. In cases where the cable shall bear some stress, Kellom grips may be used to spread the strain over a longer length of cable.
K. Where installed free-air, installation shall consider the following:
    1. Cable shall run at right angles and be kept clear of other trades' work.
    2. Cables shall be supported according to code, using "J-hooks" anchored to ceiling concrete, walls, piping supports, or structural steel beams.
    3. Hooks shall be designed to maintain cable bend to larger than the minimum bend radius (typically 4x the cable diameter).
    4. Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If cable "sag" at mid-span exceeds 6 inches, another support shall be used.
L. Cable shall never be laid directly on the ceiling grid.
M. Cables shall not be attached to existing cabling, plumbing, or steam piping, ductwork, ceiling supports, or electrical or communications conduit.
N. Manufacturers' minimum bend radius specifications shall be observed in all instances. Use of plastic cable ties is not acceptable. Cable bundles shall be neatly dressed with use of Velcro type straps.
O. Cable sheaths shall be protected from damage from sharp edges. Where a cable passes over a sharp edge, a bushing or grommet shall be used to protect the cable.
P. A coil of one foot in each cable shall be placed in the ceiling at the last support (e.g., J-hook) before the cables enter a fishable wall, conduit, surface raceway, or box. At any location where cables are installed into movable partition walls or modular furniture via a service pole, approximately 15 feet of slack shall be left in each station cable under 250 feet in length to allow for change in the office layout without re-cabling. These "service loops" shall be secured at the last cable support before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.
Q. To reduce or eliminate EMI, the following minimum separation distances from ≤480V power lines shall be adhered to:
    1. Twelve (12) inches from power lines of <5-kVa
    2. Eighteen (18) inches from high voltage lighting (including fluorescent)
    3. Thirty-nine (39) inches from power lines of 5-kVa or greater
    4. Thirty-nine (39) inches from transformers and motors
R. All openings shall be sleeved and firestopped per prevailing code requirements upon completion of cable installation.

3.06 INFORMATION OUTLET

A. Information outlets shall be flush mounted on wall-mounted boxes, in floor-mounted boxes, on surface raceway, or on modular furniture.
B. Any outlets to be added where these conditions are not met shall be positioned at a height matching that of existing services or as directed otherwise by the Site Coordinator and the Consultant. Nominal height (from finished floor to center line of outlet) in new installation shall be as follows:
    1. Standard Voice & Data Outlet (SIO) shall match adjacent electrical outlets.
    2. Wall-Mounted Telephone Outlet (Standard Voice only) shall meet ADA requirements for both front and side reach access.
C. The Contractor shall coordinate the style of the telecommunication outlets to be installed in the floor mount boxes and surface mount raceways with the Owner.

3.07 ELEVATOR INTERFACE

A. The Contractor shall furnish and install an elevator interface box outside of the elevator equipment room.

1. The Contractor shall provide an elevator telecommunications junction box located outside of the Elevator Machine Room, for interface of telecommunication cable to the elevator cab(s). This requirement complies with ANSI A17.1 code which prevents work within the Elevator Machine Room, other than specific elevator work.
2. Telecommunications J-box shall include a keyed lockable door. Additionally, the J-box shall have proper punch down blocks and data jacks suitable for terminating all cables within the J-box.
3. The Contractor shall provide any voice/data cables to this enclosure as required.
4. Electronics or cable for other systems such as security shall not be placed within this enclosure.
5. Coordinate exact location of elevator security junction box with the Elevator Contractor, Architect, and Consultant, prior to installation.
6. Cables entering the elevator telecommunications J-box and elevator equipment room shall be appropriately labeled by the Contractor, so that the Elevator Contractor can connect the appropriate wires to the elevator controllers. Wires should be individually labeled to separate them from other elevator functions and to assist the Elevator Contractor in making proper connection points.

3.08 CABLE TERMINATION

A. At the telecommunication closet, all data and voice cables shall be positioned on termination hardware in sequence of the outlet ID, starting with the lowest number.
B. Termination hardware (blocks and patch panels) positioning and layout will be reviewed and approved by the Consultant prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.
C. Cable Termination – Data/Voice UTP
    1. Data/voice patch panels shall be designed and installed in a fashion as to allow future station cabling to be terminated on the panel without disruption to existing connections.
    2. Data patch panels shall be sized to accommodate a minimum of 20% growth in the quantity of stations relative to the initial installation.
    3. At information outlets and data/voice patch panels, the installer shall ensure that the twists in each cable pair are preserved to within 0.5 inch of the termination for data/voice cables. The cable jacket shall be removed only to the extent required to make the termination.
D. Cable Termination – Fiber Optic
    1. All fibers shall be terminated using the specified connector type.
    2. All terminated fibers at the telecommunications closets shall be mated to couplings mounted on patch panels. Couplings shall be mounted on a panel that, in turn, snaps into the housing assembly. Any unused panel positions shall be fitted with a blank panel inhibiting access to the fiber optic cable from the front of the housing.
    3. All couplings shall be fitted with a dust cap.
    4. Fibers from multiple locations may share a common enclosure, but they shall be segregated on the connector panels and clearly identified. Fibers from multiple destinations may be secured in a common enclosure, provided they are clearly identified as such. Fibers from different locations shall not share a common connector panel (e.g., “insert”).
    5. Slack in each fiber shall be provided as to allow for future re-termination in the event of connector or fiber end-face damage. Adequate slack shall be retained to allow termination at a 30” high workbench positioned adjacent to the termination enclosure(s). A minimum of one meter (~39”) of slack shall be retained regardless of panel position relative to the potential work area.
    6. If the cable is armored the Contractor shall install a plastic twist-on bushing on each end of interlocking armored fiber to protect cable from sharp edges of the armor.

3.09 TEST DATA – COPPER MEDIA

A. The test result records saved by the tester shall be transferred into a Windows-based database utility that allows for the maintenance, inspection, and archiving of these test records. A guarantee shall be made that these results are transferred to the PC unaltered, i.e., “as saved in the tester” at the end of each test. Comma separated value (CSV) format is not acceptable.

B. The database for the completed job – including twisted-pair copper cabling links, if applicable –shall be stored and delivered on CD-ROM. This CD-ROM shall include the software tools required to view, inspect, and print any selection of test reports.

C. A paper copy of the test results shall be provided that lists all the links that have been tested with the following summary information:

1. The identification of the link in accordance with the naming convention defined in the overall system documentation.
2. The overall Pass/Fail evaluation of the copper channel-under-test, including the NEXT worst-case margin (margin is defined as the difference between the measured value and the test limit value).
3. The overall Pass/Fail evaluation of the fiber link-under-test, including the Attenuation worst-case margin (margin is defined as the difference between the measured value and the test limit value).
4. The date and time the test results were saved in the memory of the tester.

3.10 COPPER STATION CABLES

A. Station cabling testing shall be from the jack at the outlet in the work area to the patch panel on which the cables are terminated.

B. Testing shall be of the permanent link. Contractor shall warrant performance, however, based on channel performance and provide patch cords that meet channel performance criteria. All cabling not tested strictly in accordance with these procedures shall be retested at no cost to the Owner.

C. Testing shall be from the jack at the SIO to the patch panel on which the cables are terminated at the wiring hub.

D. Horizontal “station” cables shall be free of shorts within the pairs and shall be verified for continuity, pair validity and polarity, and wire map (conductor position on the modular jack). Any defective, split, or mispositioned pairs shall be identified and corrected.

E. Testing of the cabling systems rated at TIA Category 5e/6/6a and above shall be performed to confirm proper functioning and performance.

F. Testing of the transmission performance of station cables (Category 5e/6/6a) shall include the following:

1. Length
2. Attenuation
3. Pair to Pair NEXT
4. ACR
5. PSNEXT Loss
6. Return Loss
7. Pair to Pair ELFEXT Loss or ACRF
8. PSEFEXT Loss or PS-ACRF
9. Propagation Delay
10. Delay Skew
11. Return Loss

G. The maximum length of station cable shall not exceed 90 meters, which allows 10 meters for equipment and patch cables.

H. Worst case performance at 20°C, based on a horizontal cable length of 90 meters and equipment cord length of 4 meters, shall be as follows:

1. CATEGORY 6 (Permanent LINK)

Frequency (MHz)	Insertion Loss (Maximum dB)	NEXT Loss Pair to Pair (dB)	PS-NEXT Loss (dB; Worst Case)	ELFEXT Loss Pair to Pair (dB)	PSELFEXT loss (dB)
1.0	1.9	65.0	62.0	64.2	61.2
4.0	3.5	64.1	61.8	52.1	49.1
8.0	5.0	59.4	57.0	46.1	43.1
10.0	5.5	57.8	55.5	44.2	41.2
16.0	7.0	54.6	52.2	40.1	37.1
20.0	7.8	53.1	50.7	38.2	35.2
25.0	8.8	51.5	49.1	36.2	33.2
31.25	9.8	50.0	47.5	34.3	31.3
62.5	14.1	45.1	42.7	28.3	25.3
100.0	18.0	41.8	39.3	24.2	21.2
200.0	26.1	36.9	34.3	18.2	15.2
250.0	29.5	35.3	32.7	16.2	13.2

2. CATEGORY 6a (Permanent LINK)

Frequency (MHz)	Insertion Loss (Maximum dB)	NEXT Loss Pair to Pair (dB)	PS-NEXT Loss (dB; Worst Case)	ACRF Pair to Pair (dB)	PS-ACRF (dB)
1.0	1.9	65.0	62.0	64.2	61.2
4.0	3.5	64.1	61.8	52.1	49.1
8.0	5.0	59.4	57.0	46.1	43.1
10.0	5.5	57.8	55.5	44.2	41.2
16.0	7.0	54.6	52.2	40.1	37.1
20.0	7.8	53.1	50.7	38.2	35.2
25.0	8.8	51.5	49.1	36.2	33.2
31.25	9.8	50.0	47.5	34.3	31.3
62.5	14.1	45.1	42.7	28.3	25.3
100.0	18.0	41.8	39.3	24.2	21.2
200.0	26.1	36.9	34.3	18.2	15.2
250.0	29.5	35.3	32.7	16.2	13.2
300.0	32.7	34.0	31.4	14.6	11.6
400.0	38.5	29.9	27.1	12.1	9.1
500.0	43.8	26.7	23.8	10.2	7.2

I. In the event results of the tests are not satisfactory, the Contractor shall make adjustments, replacements, and changes as necessary and shall then repeat the test or tests that disclosed faulty or defective material, equipment, or installation method. The Contractor shall make additional tests as the Consultant deems necessary at no additional expense to the Owner or Consultant.

J. All data shall indicate the worst-case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1 MHz to highest relevant frequency, using a swept frequency interval that is consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combination and in both directions when required by the appropriate standards.

K. Cables shall be tested to the maximum frequency defined by the standards covering that performance category. Transmission Performance Testing shall be performed using a test instrument designed for testing to the specified frequencies. Test records

shall verify “PASS” on each cable and display the specified parameters—comparing test values with standards-based “templates” integral to the unit.

END OF SECTION

SECTION 27 1600
COMMUNICATIONS CONNECTING CORDS

PART 1 GENERAL

1.01 SCOPE

A. This section describes the products relating to high quality Category 6 voice and data patch cords.
B. In this section the term patch cords refers to the cords that connect Owner provided data network electronics to the horizontal cable infrastructure.
C. It is important that the horizontal cable system and the provided patch cords work as one complete system for guaranteed channel performance. Patch cords shall be manufactured by the same manufacturer as the jack and patch panels.
D. The Contractor shall provide and deliver all cords as listed in this section. The Owner will be responsible for installation of cords.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1100 – Communications Equipment Rooms
F. Section 27 1300 – Communications Backbone Cabling
G. Section 27 1500 – Communications Horizontal Cabling
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 3000 – Voice Communications
J. Section 27 4000 – AV/Multimedia General Requirements
K. Section 27 4100 – Audio Visual Systems
L. Section 27 5100 – Distributed Communications Systems
M. Section 27 6000 – Physical Security General Requirements
N. Section 27 6200 – Electronic Access Control System
O. Section 27 6400 – Video Surveillance System
P. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 CATEGORY 6 AND 6A PATCH CORDS

A. The Owner has the right to determine the final length of the patch cords after the contract is awarded.
B. All patch cords shall be round and consist of eight insulated 23 AWG, stranded copper conductors, arranged in four color-coded twisted pairs within a flame retardant jacket and be backwards compatible with lower performing categories. Modular patch cords shall utilize ISO termination method that is designed to reduce and control near-end cross talk (NEXT) and far end cross talk (FEXT) without compromising signal impedance.
C. Both ends of the cord shall be equipped with modular 8-position (RJ45 style) plugs wired straight through with standards compliant wiring. All modular plugs shall exceed FCC CFR 47 part 68 subpart F and IEC 603.7 specifications, and have 50 micro inches of gold plating over nickel contacts. Cable shall be label-verifiable. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Patch cords shall have color-coded insert molded strain relief boot with a latch guard to protect against snagging. Additional color-coding shall be available by the use of snap-in icons.
D. Patch cords shall be wired straight through. Pin numbers shall be identical at each end and shall be paired to match T568B patch panel jack wiring per ANSI/TIA/EIA-568-B. Patch cords shall be unkeyed.
E. The manufacturer of the cords shall be the same as the manufacturer for UTP termination hardware (jacks & patch panels). Cords shall be highest quality patch cords available by connectivity manufacturer.
F. The patch cords shall match the Category rating of the jack and cable it will be connecting to.
G. Contractor shall confirm patch cord lengths with Owner prior to ordering.
H. This Contractor shall provide the following patch cords (for pricing purposes only; refer to section 3.04 below):

Qty	Length	Notes	Category	Color
1 per drop	3-9 feet	MDF/IDF – Standard Data	Cat6	Yellow
1 per drop	3-9 feet	MDF/IDF – Cameras	Cat6	Pink
1 per drop	3-9 feet	MDF/IDF – WAPs (non-Erate)	Cat6A	Blue
1 per drop	3-9 feet	MDF/IDF – WAPs (Erate)	Cat6A	Green
1 per drop	10-15 feet	Workstation – Standard Data	Cat6	Yellow
1 per drop	10-15 feet	Workstation – Cameras	Cat6	Pink
1 per drop	10-15 feet	Workstation – WAPs (non-Erate)	Cat6A	Blue
1 per drop	10-15 feet	Workstation – WAPs (Erate)	Cat6A	Green

2.03 FIBER OPTIC PATCH CORDS

A. The Owner has the right to determine the final length of the patch cords after the contract is awarded.
B. All MM fiber optic patch cords shall:
   1. Be duplex 2-3mm tight buffer design with Aqua jacket.
   2. Have LC-LC connectors with straight thru connectors (A-A Polarity).
   3. Have 50-micron OM3 core.
   4. Have 8-9 micron OS2 core.
C. This Contractor shall provide the following patch cords (for pricing purposes only; see section 3.04 below):

Qty	Length	Notes

1 per drop	3 meters	MM Non-Plenum

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.02 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.03 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.04 ORDERING AND DELIVERY

A. Prior to ordering patch cords the Contractor shall schedule meeting with Owner and Consultant to verify patch cord lengths, colors and quantities.
B. Contractor shall coordinate delivery of patch cords with Owner. Contractor shall have list of delivered cords and shall have Owner sign delivery sheet at time of delivery.

END OF SECTION

SECTION 27 1800
COMMUNICATIONS LABELING AND IDENTIFICATION

PART 1 GENERAL

1.01 SCOPE

A. This section describes the products and execution requirements relating to labeling of telecommunications cabling, termination components, and related subsystems. Covered systems include the following:
   1. Equipment room backboards and equipment racks
   2. Station cable and terminating equipment
   3. Telecommunications grounds and related components

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1100 – Communications Equipment Rooms
F. Section 27 1300 – Communications Backbone Cabling
G. Section 27 1500 – Communications Horizontal Cabling
H. Section 27 1600 – Communications Connecting Cords
I. Section 27 3000 – Voice Communications
J. Section 27 4000 – AV/Multimedia General Requirements
K. Section 27 4100 – Audio Visual Systems
L. Section 27 5100 – Distributed Communications Systems
M. Section 27 6000 – Physical Security General Requirements
N. Section 27 6200 – Electronic Access Control System
O. Section 27 6400 – Video Surveillance System
P. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 00 00.

2.02 LABELS

A. All labels shall be permanent and be machine generated (e.g., Brady or Panduit). No handwritten or non-permanent labels shall be allowed. Labels shall be Brady “I.D. Pro” or XC-Plus or equivalent. Labeling on backboards and/or equipment racks may be pre-cut adhesive type.
B. Characters on all labels shall be black printed on a white background.
C. Label size shall be appropriate to the cable size(s), outlet faceplate layout, patch panel design, or other related equipment sizes and layouts.
D. All labels to be used on cables shall be self-laminating, white/transparent vinyl, and be wrapped around the cable sheath. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminated over the full extent of the printed area of the label.
E. Labels used to identify innerduct carrying fiber optic cable shall be labeled with a durable yellow polyethylene tag that reads “CAUTION Fiber Optic Cable” and includes blank spaces for adding (1) fiber count and (2) destination information. An example of a compliant product is VIP Products’ “Caution Write-On Coverall Tag.”

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.02 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.03 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.04 GENERAL

A. The Contractor shall match the Owner’s standard labeling scheme.
B. Clean surfaces before attaching labels.
C. Install all labels firmly. Labels attached to terminating equipment such as backboards, faceplates, 110 blocks, and patch panels shall be installed plumb and neatly on all equipment.

3.05 LABELING OF CABLING AND TERMINATION COMPONENTS

A. Backboard and Equipment Racks
    1. Backboards and equipment racks shall be labeled by the Contractor identifying the telecommunication room. Additionally, equipment racks shall have an alpha character after the room number unique to that particular communications closet. For example, TR1-A would be the first rack in TR1.
    2. Character height shall be 1-inch (minimum).
B. Cabling
    1. Horizontal cables shall have a machine generated wrap around cable label within 4” of each end of the cable. Label shall be clearly legible and meet TIA-EIA 606 standards. Character height shall be .25” (minimum).
    2. Voice/data/video backbone cables shall have a machine generated wrap around cable label within 12” of each end of the cable. Label shall be clearly legible and meet TIA-EIA 606 standard. Character height shall be .5” (minimum).

3.06 FIBER OPTIC BACKBONE, RISER CABLES, AND TERMINATION COMPONENTS

A. All fiber optic backbone and copper (inter-building, riser, and tie) cables shall be identified AT BOTH ENDS with a designation that identifies where the opposite end of the same cable terminates (e.g., equipment room or telecommunications room I.D.). In addition, labeling of all fiber optic cables shall include the number of fibers in the cable.
B. Each fiber optic termination panel shall be clearly labeled indicating the destination of the cable(s) and the fiber number of each fiber position. The cable identifiers are to be secured to (1) the side and (2) the front cover of the panel enclosure.

3.07 STANDARD INFORMATION OUTLET (SIO) FACEPLATES

A. All faceplates shall be clearly labeled indicating the destination of the cable(s) (telecommunication room number), the data patch panel(s) letter designation, the data port number(s) on the data patch panel(s), and the voice cable number(s).
B. Telecommunications outlets are to be labeled (1) on the cover of the assembly and (2) on each cable terminated at that location.
C. Station cables shall be labeled within two inches of the cable end.

3.08 DATA PATCH PANELS

A. All data patch panels shall be clearly labeled indicating the telecommunication room number, the data patch panel letter designation, and the data port number on the data patch panel (ports 1 through 48). Each telecommunication room shall start with data patch panel ‘A’ and continue through the alphabet.
B. A data port schedule for each telecommunication room shall be created in spreadsheet format (Excel) with the telecommunication room number, data patch panel letter designations, data port numbers, and room numbers identified in the spreadsheet. In addition, for each data patch panel port, a field shall be provided in the spreadsheet for the Owner to manage the cabling infrastructure by recording the device and any special notes pertaining to the room utilizing the data cable terminated to the port.
C. Refer to Telecommunication “T” Series Project Drawings for standard information outlet faceplate and data & voice patch panel labeling scheme requirements. A sample of the data and voice port schedules is to be provided to the Owner, in the cable record book and in electronic format (Excel spreadsheet), with final documents provided on the Project Drawings.

3.09 FIBER OPTIC CABLES AND TERMINATION COMPONENTS

A. All fiber optic cables, termination enclosures and connector panels, and splice closures shall be clearly labeled.
B. In addition, labeling of all fiber optic cables shall include the number of fibers in the cable.
C. Each fiber optic termination panel shall be clearly labeled indicating (1) the destination(s) of the cable(s) and (2) fiber number of each fiber position. The cable identifiers are to be secured to (1) the side and (2) the front cover of the panel enclosure.

3.10 GROUND SYSTEM LABELING

A. All grounds shall be labeled as close as practical to the point of termination (for ease of access to read the label). Labels shall be nonmetallic and include the following statement: “WARNING: If this connector or cable is loose or must be removed, please call the building telecommunications manger.” Refer to ANSI/TIA/EIA 606 for additional labeling requirements.

END OF SECTION

SECTION 27 4000
AV MULTIMEDIA GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 00 00 for additional project scope information.
B. Successful bidder shall provide, install, configure, and provide warranty service for audiovisual systems, including displays, audio/video/graphics switching and distribution systems, integrated control systems, and other equipment as described herein.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1500 – Communications Horizontal Cabling
F. Section 27 1600 – Communications Connecting Cords
G. Section 27 1800 – Communications Labeling and Identification
H. Section 27 4100 – Audio Visual Systems

1.03 REFERENCE

A. In addition to any requirements below, Contractor shall abide by requirements delineated in 27 0000 including but not limited to:
    1. General: Definitions, reference standards and codes, qualifications, pre-construction submittals, construction progress submittals, closeout submittals, and correction period.
    2. Products: Substitutions, product specifications, miscellaneous material, cable, connectors, power devices, and interface panels.
    3. Execution: Coordination, testing, training, warranty, and cable management.

1.04 DEFINITIONS

A. HDCP: High-bandwidth Digital Content Protection or a security protocol designed to limit unauthorized use of protected content. Where applicable, HDCP compliant devices shall be utilized per design specifications. Use of HDCP compliant systems designed herein is the responsibility of the end user and compliance with Owner's Fair Use policies.
B. EDID, E-EDID: Extended Display Information Data, Enhanced-Extended Display Information Data or a remotely readable (read by a source) data file that resides in a display or specialized audiovisual device – commonly referred to as a "sink" – describing the capabilities of the sink to a connected source.
C. Configuration: the software and firmware programming that defines and creates the functionality, levels, presets, and settings of devices.
D. Configure: To define functionality, levels, presets, and settings of device(s) using software and/or firmware.
E. Programmer: Contractor personnel engaged in developing the configuration of systems.
F. DSP: Digital Signal Processing, or Digital Signal Processor.
G. AEC: Acoustic Echo Cancellation.
H. Fixed Architecture: Referring to software providing fixed processing paths with adjustable processing objects in a predetermined sequence.
I. Open Architecture: Referring to software providing infinitely variable Programmer selected processing paths with adjustable processing objects arranged in any sequence deemed appropriate by Programmer.

1.05 REFERENCE STANDARDS AND CODES

A. Giddings, G. H. Philip. *Audio Systems – Design and Installation*.
Focal Press, 1990.
Focal Press, Elsevier Inc.
30 Corporate Drive, Suite 400
Burlington, MA 01803

B. *AV Installation Handbook, Second Edition.*
InfoComm International, 2009.
11242 Waples Mill Road, Ste. 200
Fairfax, VA 22030

C. *Audiovisual Systems Performance Verification (ANSI/Infocomm 10:2013)*
InfoComm International, 2013.
11242 Waples Mill Road, Ste. 200
Fairfax, VA 22030
http://www.infocomm.org/cps/rde/xchg/infocomm/hs.xsl/35975.htm

D. *Dashboard for Controls Template, Design Reference, and Integrators Guide.*
InfoComm International.
www.infocomm.org/cps/rde/xchg/infocomm/hs.xsl/35324.htm

E. Copyright Act of 1976
U.S. Copyright Office
101 Independence Ave. S.E.
Washington, DC 20559
Phone: (202) 707-3000

1.06 QUALIFICATIONS

A. Primary AV Contractor shall have at least one (1) employee assigned to the project in a design or management role, and at least one (1) employee assigned to the project in an installing technician role, holding at least one of the follow certifications:
   1. CTS (InfoComm International)
   2. CTS-I (InfoComm International
   3. CTS-D (InfoComm International)
   4. EST-L2 (National Systems Contractor Association)

B. DSP Programmer
   1. Training: Programmer shall have received manufacturer-provided and/or manufacturer approved training in the configuration of the DSP systems being provided.
   2. Certification: Programmer shall hold the highest applicable manufacturer programming certification(s) offered by the manufacturer(s) of the DSP hardware.

C. Control System Programmer
   1. Training: Programmer shall have received manufacturer-provided and/or manufacturer approved training in the configuration of the integrated control systems being provided.
   2. Certification: Programmer shall hold the applicable manufacturer programming certification(s) or be an authorized independent programmer of the integrated control systems.
      a. For AMX: AMX Certified Expert (ACE Programming Expert)
      b. For Crestron: Crestron Certified Programmer
      c. For Extron: Extron Control Professional
      d. Or approved equal

D. Refer to subsequent sections for section specific qualification requirements.

1.07 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 00 00 for additional requirements.
B. Structurally Mounted Elements: Including but not limited to monitors, projectors, projection screens, and loudspeakers.
C. Frequency Assignment Plans: Provide for all wireless microphones.

D. Custom Engraving: Layout and labeling/engraving of custom products including wall plates and interconnection panels. Provide engraving detail with material and finish detail.
E. Power Distribution: Plan for distribution and switching of AC and DC power to all audiovisual devices, including sequencing order of outlets and banks. Time delay to be field configured as necessary for proper system power up and down.
F. Colors: Confirm color option selections with Architect per location for items such as speakers, projectors, plates, etc.
G. Layouts of physical and virtual user controls in graphical format. This shall include:
    1. Engraved buttons and overlays
    2. Machine-printed adhesive labels
    3. Graphical user interfaces for touch panels or web interfaces
    4. Descriptive write-up of function(s) of each button for each page.
H. Copy of manufacturer configuration software, or link to manufacturer website download page for accessing configuration software.
    1. Version: Submitted software shall be identical version used to create Audio DSP configuration.
I. Integrated control system review shall be done via web conference with Consultant.
J. Contractor shall make changes as requested by Consultant in pre-construction submittal review.

1.08 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.09 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.
B. Quick-Reference Guides: Contractor shall create a concise quick-reference guide covering normal system operation and basic troubleshooting procedures for each room/system type. Length of each quick-reference guide shall be commensurate with the information needed for successful operation, subject to Owner approval.
    1. Upon Owner approval, Contractor shall provide two (2) laminated copies and one (1) digital copy for each room/system type.
C. Serial Numbers: Contractor shall provide a list of serial numbers for all supplied components with serial numbers and with a unit price greater than $99. Organize list by room/system type.

1.10 CORRECTION PERIOD

A. Length of Period: Contractor shall offer a one year correction period to Owner for this system. Contractor shall repair all equipment and cabling problems at no additional cost to Owner during the correction period.
B. Commencement: Correction period shall begin at date of Final Acceptance.
C. Final Acceptance: shall be defined as the date at which all contract work (save for a correction period) is complete, including punch list completion & verification, closeout submittals, and written verification by the Owner is obtained by the Contractor that the systems have been accepted.
D. Response: Contractor shall respond by phone within two (2) hours to calls for service or assistance from Owner during normal business hours for the duration of the correction period.
E. On-site Response: Contractor shall respond on-site within eight (8) business hours from the time of the initial phone contact in the event that the issue cannot be resolved over the phone.
F. Equipment on Loan: Contractor shall loan equipment for any broken, defective, or non-functional equipment that cannot be repaired and returned within one week. Contractor shall provide shipping, delivery, and integration at no additional cost to Owner.

Equipment shall be comparable in size, speed, brightness, and relevant performance specifications, as determined by Owner.

G. Projection Lamps: Projection lamps are to be warranted by Contractor for a minimum of 90 days, or the rated life expectancy of the lamp, whichever comes first.

H. Damaged Equipment: Equipment that is damaged due to intentional misuse, abuse or negligence is not covered under this warranty; however, Contractor shall assist Owner in putting the system back in working order in the shortest possible timeframe while charging normal service rates for labor and equipment.

1.11 OWNERSHIP

A. Property Rights: Contractor assigns to Owner any and all intellectual property rights and applications made by Contractor, or its agents or employees in connection with the performance of this contract. Contractor also acknowledges and agrees that services rendered in connection with the performance of this contract shall be a “work made for hire” within the meaning of Section 201 inventions of the Copyright Law of 1976.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 0000.

2.02 PRODUCT SPECIFICATIONS

A. Provisions: Product specifications are provided in subsequent sections to Contractor for the appropriate configuration and/or provision of accessories as well as for a guide to indicate key features for possible substitutions.

B. Where wireless microphone systems are specified, Contractor shall determine optimal frequency range for final product selection and submit Manufacturer’s recommended frequency band for Owner and Consultant approval prior to ordering equipment. Contractor shall provide congruent frequency band products where like systems are specified for interoperability of components. Where three (3) or more wireless microphones are specified within the same system, Contractor shall provide and install necessary antennae distribution for optimal performance, to be submitted for Owner and Consultant approval during pre-construction phase.

C. Interconnections: Contractor shall be responsible for providing populated, grommeted, or blank cover plates for all wall and floor box openings intended for audiovisual systems.

D. Twisted Pair (TP) Category Cabling: Contractor shall use twisted pair Category cable as recommended by manufacturer of transmission equipment for optimal bandwidth and signal timing. Where cable type is not specified by manufacturer, Contractor shall use shielded twisted pair Category 6 cabling. Cable type shall be detailed in pre-construction submittals with any deviations from manufacturer recommendations expressly noted.

E. Mounts: Contractor shall fabricate mounts for projectors, monitors, loudspeakers, cameras, etc. as necessary, and shall modify standard mounts as required for optimal mounting configurations. Intended hardware shall be detailed in shop drawing submittals.

1. Custom mounting configurations shall be submitted in shop drawings for review.
2. Contractor shall provide all hardware as necessary, including flanges, Unistrut, threaded pipe, column extensions, yokes, clamps, threaded rod, aircraft cable, and any other hardware required to securely mount equipment.
3. All ceiling tile penetrations shall be neatly finished with a plate, grommet and/or escutcheon ring.

2.03 MISCELLANEOUS MATERIAL

A. Required Equipment: Contractor shall provide additional system components typically and reasonably required to make system operational even though not specifically indicated in Drawings, Appendices or Specifications including, but not limited to, cable, connectors, connecting accessories, adaptors, power supplies, power strips, rack mounting adapters and shelves, cover plates and closure panels, relays and switches, remote antenna mounts, terminal blocks, and related connector and termination hardware required by but not supplied with the equipment.
B. Blank Fill Panels: Contractor shall provide blank fill panels to cover any openings in equipment racks provided under this contract whether specified in the equipment schedules or not. Fill panels shall match finish of specified rack hardware.
C. Power Distribution Strips: Contractor shall provide power distribution strips as necessary for distributing power within equipment racks and consoles. Strips shall be UL listed, be securely mountable, and appropriate for professional installation.
D. Wall Openings: Contractor shall provide blank faceplates to cover any unused openings within the project area. Faceplate type and finish to match electrical outlets in the project.
E. Input Cables: Contractor shall provide all interconnection cables shown on the project drawings, as well as end-user input cables at all locations where laptops and other user devices are intended to be connected.
F. Keys: Keys for like equipment shall be identical.
G. Wireless Transceivers: Where wireless transceivers are specified (including, but not limited to wireless microphones, wireless assistive listening devices, etc.) Contractor shall verify frequency band range of existing Owner wireless systems. Contractor shall provide wireless transceiver system(s) compatible with existing equipment for interoperability.
H. Cable Sleeving:
    1. Shall be black expandable sleeving, with ends neatly turned under 2”, held in place either by nylon tie-wrap, or heat-shrink tubing. Tie wraps, if used, shall not deform cables within the umbilical. Cables requiring sleeving include:
        a. Exposed cabling outside of wire management in console furniture.
        b. Cable umbilicals connecting to or from wall, floor, or ceiling plates consisting of more than one wire.
    2. Contractor shall coordinate as necessary so that all low-voltage cabling (including Ethernet) are included in a single umbilical

2.04 POWER DEVICES

A. Refer to Section 27 0000 for additional requirements.
B. All large venue audio amplifiers shall be on sequenced outlets.

2.05 FIRE STOPPING MATERIALS

A. Refer to Section 27 0000 for additional requirements.

PART 3 EXECUTION

3.01 EQUIPMENT

A. As required by Section 27 0000.
    1. Safety: Contractor shall use proper structural installation techniques and maintain a minimum 5:1 safety margin.
    2. Custom Mounting Finish: Custom mounting hardware shall be painted by Contractor to match either color of wall, ceiling or equipment, at Consultant’s discretion.

3.02 SPARE PARTS AND REMOTE CONTROLS

A. Projector lamps and filters
B. Remote controls and batteries

C. Adapters

3.03 INTERCONNECTION

A. As required by Section 27 0000.

1. Interpretation: Contractor shall make system interconnections as indicated on Drawings and specified herein. Contractor shall interpret Drawings using an understanding of the equipment and general system topology (both existing and future/specified). Contractor shall provide power and control lines to and from power supplies, remotely controlled equipment and other devices even though not explicitly indicated on Drawings or listed in equipment tables.
2. Additional: Contractor shall be responsible for associated equipment signals not specifically documented in provided drawings. These include synchronizing signals, transmitting and receiving antennas, and LAN connections to equipment provided and/or installed by Contractor.
3. Mass Notifications: Contractor shall ensure that audio systems are appropriately managed by emergency notifications so that emergency notifications are not impeded by the audio system.

3.04 CABLE MANAGEMENT

A. As required by Section 27 0000.

1. Above Ceiling: Cabling located above ceilings shall be tied off to and supported by ceiling supports or other structures at a minimum of eighteen (18) inches above the ceiling.
2. Not on Ceiling: Cabling shall not lie on the ceiling.
3. Wall Cabling: Cables installed in a horizontal fashion along wall surfaces shall be installed in surface raceway approved by Owner and Consultant.
4. Floor Cabling: Cabling placed at floor level such as microphones shall be installed on the floor in the shortest possible route to the nearest wall considering traffic patterns and in an enclosure designed for that use and offering protection from foot traffic.
5. Desk Cabling: Where a cable is installed inside desk furniture, a means of protecting the cables and holding cabling to a fixed surface shall be installed.
6. Grommets: Holes in horizontal furniture surfaces for cable pass-through shall be provided with appropriate sized grommet. Grommet shall be black unless otherwise specified or required.
7. Stub-ups: Where conduit is stubbed-up through the floor and exposed, Contractor shall wrap cables with black expandable sleeving and secure at least three (3) inches below level of conduit top.
    a. Where conduit is stubbed-up through floor and concealed within furniture, Contractor shall install tether comprised of aircraft cabling to limit the distance furniture may be moved away from stubbed-up conduit. Cabling service loop exiting stubbed-up conduit and entering furniture shall be longer than the corresponding tether, providing protection against movement of furniture that would otherwise damage installed cabling.
8. Umbilicals: Exposed cable umbilicals, such as those between instructional furniture and a floor- or wall-mounted plate, shall be covered in black expandable sleeving, with neatly finished ends (heat-shrink or Consultant-approved method).

3.05 CONNECTOR TERMINATION

A. As required by Section 27 00 00.

1. Video Connectors: Video connectors (BNC, RCA, and F) shall be terminated using a crimp tool or dies designed specifically for the connectors being applied.
2. XLR Connectors: Terminate XLR type connectors wired pin 2 high, pin 3 low, and pin 1 shield.
3. UTP: UTP cable shall be terminated with appropriate crimps tools or tools specified by manufacturer.

3.06 GROUNDING

A. Audiovisual equipment racks shall be grounded to the telecommunication grounding system with a minimum 6 AWG grounding cable. Refer to Section 27 0000 and 27 0526 for additional grounding requirements.

3.07 TESTING & INSPECTION

A. General Information: As required by Section 27 0000.
B. Notification: Prior to start of testing, provide a list to Consultant of test equipment make, model numbers and calibration dates that will be used.
C. Testing: Contractor shall perform complete testing on system before inspection. Selected systems may be retested during inspection at Owner's discretion.
D. Display/Output checks: Contractor shall verify that visual and audio outputs from the system are high-quality and without noticeable distortion or feedback at normal operating levels.
E. Wiring and Labeling: Contractor shall check all inputs and outputs for correct wiring and labeling.
F. Loudspeakers: Contractor shall measure the impedance of each speaker line leaving the equipment racks. For full range devices, use a frequency of 1000 Hz. For band limited devices, use a frequency appropriate for the operating range of the transducer. When documenting results, Contractor shall include the calculated impedance based on number of units on a line and the size and distance of the run. Contractor shall correct any field readings that differ more than 20% from the calculated impedance. Contractor shall use an electronic polarity checker to test each reinforcement speaker. Speakers shall have the same relative polarity.

3.08 COMPUTER GRAPHICS

A. Computer graphics shall be crisp and focused with respect to color alignment. If color alignment is not registered properly, Contractor shall identify source of problem and correct. EDID and other auto-registration features shall be set within AV equipment where required for optimal system performance.

3.09 TRAINING

A. General Information: As required by Section 27 0000 and following section(s).
B. Coordination and Personnel: Training shall be coordinated with Owner's schedule, and Contractor personnel who provide training are subject to Owner's approval.

3.10 PROJECT CLOSEOUT

A. Completion: System shall be considered complete when all of the following has occurred:
    1. Testing has been completed to the satisfaction of Owner and Consultant.
    2. Punch-listed items have been addressed to the satisfaction of Owner.
    3. As-built drawings and system documentation has been turned over to Owner and Consultant.
    4. Complete operational training has been conducted with Owner's staff.
    5. System Commissioning Process has been completed.
B. Acceptance: Contractor shall secure written Acceptance of systems in the form of authorized Owner signature on Acceptance Document. This shall constitute the Date of Acceptance.

END OF SECTION

SECTION 27 5100
DISTRIBUTED COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 0000 for additional project scope information.
B. The Category 6 cabling to each IP enabled device shall be provided by the structured cabling Contractor. Patch cords for the IP devices to the network switches shall be furnished by this Contractor and installed by the Owner with participation by this Contractor. Patch cords from the IP device to the data jack shall be furnished by this Contractor and installed by this Contractor.
C. System installation shall include, but not be limited to, installation, programming, and configuration of system components as well as all associated software upgrades, patches, and maintenance for the first year.
D. The contractor shall provide public address call points and clock devices as shown in drawings. These devices shall be interconnected with the existing campus communications and clock systems. It shall be the responsibility of the contractor to determine the type and quantity of control and distribution devices required to provide a complete and functional system. Existing devices outside the scope of work which might be affected by the work shall be covered and maintained in place. If an existing device must be removed as part of the renovation, the contractor shall be responsible for covering, maintaining, and reinstalling the device in the existing location. Such devices shall be tested prior to system check out and if any existing devices are found to be faulty, they shall be replaced at no cost to the Owner.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1100 – Communications Equipment Rooms
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 6000 – Physical Security General Requirements
J. Section 27 6200 – Electronic Access Control System
K. Section 27 6400 – Video Surveillance System
L. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional requirements.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.
B. Training: Programmer shall have received manufacturer-provided and/or manufacturer approved training in the configuration of the distributed communications system(s) being provided.
C. Certification: Programmer shall hold the highest applicable manufacturer programming certification(s) offered by the manufacturer(s) of the distributed communications system(s) hardware.

D. Submittal: Certification certificate shall be submitted with distributed communications system(s) submittals.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.07 PRE-INSTALLATION PROCEDURES

A. Refer to section 27 0000 for additional requirements.

1.08 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.09 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.10 DRAWING SHEETS

A. New devices and Category 6 cabling shall be provided at each location with a label “N#-##.”
B. New devices and Category 6 cabling shall be provided to replace existing devices and cable at each location with a label “E#-##”.
C. Existing devices and cabling shall be demolished at each location with a label “D#-##”. In these cases, the Contractor shall patch and paint the holes in drywall, provide a cover plate for recessed concrete or replace the ceiling tile. Ceiling tiles will be provided by the Owner.

1.11 MOUNTING AND INSTALLATION

A. Contractor shall provide the appropriate mounting hardware for all ceiling types and wall types where devices will be located.
B. Exterior devices shall be installed in a sealed backbox with a weather hood.

1.12 CODE AND STANDARD REQUIREMENTS

A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association and any other codes as required by the AHJ.
B. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.
C. Other applicable codes and standards are as follows:
    1. ANSI/IEEE C2 – National Electrical Safety Code
    2. NFPA 70 – National Electrical Code
    3. TIA/EIA 568-C-1, 2, 3 Standards

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Basis of design shall be Valcom. Substitutions are not acceptable.

2.02 INTERCOM SYSTEM GENERAL DESCRIPTION

A. The Intercom System shall utilize a IP SIP based headend capable of communicating with IP, SIP, 2-wire digital and 4-wire analog intercom stations as well as outputs to connect to paging systems as an extension.
B. The system shall be capable of line supervision, speaker supervision and microphone supervision of each station and provide immediate notification of failures.
C. The system shall be capable of server to server or server to virtual server failover.
D. The system shall be capable of full duplex by default or selectable half duplex or simplex.
E. The system shall be capable of group calls, all calls and individual station calls.

F. The system shall be capable of initiating emergency calls by pushing a call button.
G. The system shall be capable of silencing individual call stations that become a nuisance.
H. The system shall be capable of connecting to a VoIP telephone or analog PBX system to initiate intercom calls or pages.
    1. The Contractor shall provide the interface that is compatible with the Owners system. The Owner's existing system is a Valcom IP6000.
I. The system shall be fully firmware and software upgradable from a centralized network location.
J. All software required for programming and licenses required for operation of the system shall be provided.
K. Manufacturer:
    1. Rauland

2.03 AUDIO GATEWAY

A. PoE
B. Provides analog audio output and relay control
C. Acceptable Product:
    1. Valcom VE-8001

2.04 PAGING ZONES

A. New devices added to the existing system shall conform to the existing zoning standards. New modules and amplification shall be provided to add communication devices as required.

2.05 ZONE PAGE MODULE

A. Acceptable Product:
    1. Valcom VE-8004 with V-C124P power supply

2.06 PAGING SPEAKERS

A. All speakers shall operate from a 24-volt distribution system.
B. Speakers shall have audio and physical characteristics that are compatible with the total system.
C. Loudspeaker locations shown in the drawings are approximate and subject to change based on field conditions. Contractor shall abide by the submittal process described in the division 27 specifications to coordinate final loudspeaker locations.
D. Refer to drawings and details for specific product information.

2.07 PAGING VOLUME CONTROLS

A. Analog attenuator with priority relay-actuated bypass
B. Decora-style wall plate
C. Provide power and interface modules as required for full system functionality.
D. Acceptable Product:
    1. Quam QC10P
    2. Or Rauland equal

2.08 AMPLIFIERS

A. The Contractor shall supply and install appropriate number and size of amplifiers to ensure amplifiers will normally be operating at no more than 80% of the rated power. The installation shall meet manufacturer recommendations.
B. Acceptable Product:
    1. Ashly NE series

2.09 CABLE

A. Cable shall be provided and installed that meets manufacturer recommendations for equipment and signal types that are being transmitted. Refer to Division 27 specifications for UTP cable requirements.
B. 25v speaker cable shall be 18 awg, 2-conductor, twisted, shielded cable. Provide plenum rated cable when required.
C. Digital intercom cable shall be 22 awg, 2-conductor, twisted, shielded cable. Provide plenum rated cable when required.
D. Analog intercom cable shall be 18 awg, 2-conductor, twisted, shielded cable. Provide plenum rated cable when required.
E. 75 ohm RG-6 Quad Shield
    1. Center conductor: 18 AWG bare copper covered steel; 0.040" O.D. (nominal); foamed polyethylene dielectric.
    2. Quad Shield:
        a. First shield: aluminum-polypropylene-aluminum laminated tape with overlap bonded to dielectric.
        b. Second shield: 60% 34 AWG bare aluminum braid wire.
        c. Third shield: non-bonded aluminum foil tape.
        d. Fourth shield: 40% 34 AWG bare aluminum braid wire.
    3. Provide plenum cable when installed in a plenum air handling space.
    4. Manufacturer:
        a. Belden
        b. Windy City Wire
        c. Or approved equal

2.10 WIRELESS CLOCK SYSTEM

A. General
    1. Install new clock devices as shown in drawings, to be synchronized to existing campus clock system.
    2. All new clocks shall be hard-wired for power. Battery operated clocks are not acceptable.
    3. All new clock devices shall be digital with red digits.
    4. Clocks in corridors and small common areas shall have 2.5-inch digits.
    5. Clocks in large assembly areas requiring more than 75 feet of viewing distance shall have 4-inch digits.
    6. Contractor shall provide wire guards for clocks in gymnasiums.
    7. Contractor shall provide any transmitters/repeaters as necessary to keep all clocks reliably synchronized.
    8. Acceptable Manufacturer:
        a. Valcom
        b. Or Dallas ISD approved equal
B. Single-Faced, 2.5-inch Digital Clock (D1):
    1. Valcom VL5 20
C. Dual-Faced, 4-inch Digital Clock (D2):
    1. Valcom VL5 22
D. Single-Faced, 4-inch Digital Clock (D1 in gymnasium and cafeteria)
    1. Valcom VL5 50

PART 3 EXECUTION

3.01 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.02 TRAINING

A. Refer to Section 27 0000 for additional requirements.

3.03 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.04 INSTALLATION PRACTICES

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner reserves the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.
B. The Owner reserves the right to halt any installation due to failure of Contractor to observe installation-free periods due to instructional or administrative requirements. To the maximum extent possible, the Owner will provide advance notice of such periods.
C. Contractor is responsible for providing a complete and functional intercom and PA systems.
D. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.
E. Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.

3.05 COORDINATION

A. Contractor shall provide up to 8 hours (up to four, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with network configuration.
B. Verify that the manufacturer approved or recommended server hardware and operating system meets the Owner's IT department standards prior to ordering.
C. Coordinate server power, cooling, and mounting requirements with Owner prior to installation.
D. Coordinate virus scan/security software requirements with Owner and manufacturer prior to installation.

3.06 TRAINING

A. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.
    1. Contractor shall provide up to 12 hours of scheduled and dedicated training time in four (4) three (3) hour sessions for administration and management of the systems.
    2. Contractor shall provide up to 2 hours of scheduled and dedicated training time for maintenance personnel.
    3. Provide printed training materials for each trainee, including product manuals, course outline, workbook and student guides.
    4. Provide hands-on training with operational equipment.
    5. Training shall be oriented to the specific systems being installed under this contract as designed and specified.
    6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.07 AESTHETICS

A. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.
B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.
C. All surface-mounted devices shall be firmly secured level and plumb
D. All rack mount equipment shall be securely installed.

3.08 HARDWARE LAYOUT

A. Hardware positioning and layout shall be reviewed and approved by the Consultant and Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.09 DEVICE CABLING/WIRING INSTALLATION PRACTICES

A. All external wire and cables shall be supported in maximum five foot intervals from the structure or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables. Provide j-hooks as needed where cable tray or raceway is not available.
B. Contractor shall coordinate installation with Division 27 0500 cabling Contractor to ensure there is at least 2-inches of physical separation between security cabling and voice/data cabling throughout cable path. Voice/data cabling Contractor has first claim to cable tray.
C. 70-Volt speaker cabling shall not share cable pathways with other cabling.
D. All cables, regardless of length, shall be labeled within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified.
E. All cables shall have 6-foot service loops neatly coiled in the equipment room. During initial cable rough-in, Contractor shall have sufficient slack to route anywhere within the equipment room.
F. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost. **Plastic zip ties are not allowed.**
G. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.
H. Cables shall not run above red iron joist.
I. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.
J. Ties and straps shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.
K. Contractor shall notify Owner immediately if obstruction or hazard is discovered in a pathway provided by others.
L. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer’s rating.
M. No splices shall be installed in any UTP cable unless prior approval from Consultant is given.

3.10 CABLE TERMINATION

A. Termination hardware (blocks and patch panels) positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.11 INTEGRATION WITH PHYSICAL SECURITY SYSTEMS

A. The intercom system shall be integrated with the video surveillance system, electronic access control system and intrusion detection systems.
    1. The integration interface shall be via an Ethernet interface.
    2. The intercom to video surveillance integration shall be via SIP (Session Initiation Protocol) interface.
        a. The intercom stations shall operate in a SIP to SIP mode with the video surveillance system listening and recording the audio to the associated camera time synchronized for seamless video/audio playback.

B. The intercom stations shall be associated with cameras from the video surveillance system.
C. The Contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.
D. The Contractor shall provide any needed expansion boards for integration.
E. The system shall integrate with Microsoft Active Directory.
F. The system shall integrate with Microsoft Exchange Server for the purpose of sending email notifications.
G. Refer to each integrated systems specification sections for additional specific integration requirements.
H. The intercom and PA systems shall be time syncing to a common NTP server as all the integrated systems.
I. The Contractor shall set up a meeting between the Owner, Consultant and manufacturer to determine the exact functionality of the integration before the installation and integration starts.

3.12 FIRE STOPPING

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for Contractor to pass cable through, shall be the responsibility of the Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.
B. Contractor shall be responsible for providing a waterproof seal in and around any openings to the outside environment intended for use by the Contractor.
C. Any existing openings discovered that should be fire stopped should be brought to the attention of the Owner.

3.13 SYSTEM TESTING PROCEDURES

A. Prior to energizing or testing the system, ensure the following:
    1. All products are installed in a proper and safe manner per the 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. All products are neat, clean, and unmarred, and parts are securely attached.
B. Contractor shall ensure that each device in the system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.
C. Contractor shall be responsible for the following testing procedures:
    1. Measure each area's ambient noise level during normal business operation.
    2. Provide amplifier(s) and estimate speaker transformer tap values that provide acceptable performance without exceeding 80% of the amplifier's RMS power.
    3. Acceptable performance is deemed to mean that a voice page or intercom call is 15 dB over the Ambient Noise level when measured at 5 feet above finished floor. Make all necessary adjustments per Owner and Consultant request.
D. Contractor is ultimately responsible to ensure the overhead paging system voice pages are a minimum of 15 dB over the Ambient Noise Level in each area without exceeding 80% of the amplifiers' rated power.
E. Inspection: After Contractor's testing is complete and the system is properly adjusted, the Contractor shall contact the Owner to schedule a "spot test" of the system with the Owner and Consultant. Contractor shall make changes/adjustments per Owner and Consultant's request at no additional cost to Owner. These adjustments may include but not be limited to:
    1. Adjusting volume control of amplifier.
    2. Adjusting local volume control of individual speaker.

3. Re-tapping up to 20% of speakers at different wattage.

3.14 SYSTEM INSPECTION

A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.
B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.
C. Contactor shall verify with Project Representative the precise positioning of camera aim and shall make fine adjustments as requested.

3.15 LABELING

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on Project as-built drawings.

3.16 DOCUMENTATION

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval as described in section 27 0000 and 27 6000. All documentation shall become the property of the Owner.
B. Documentation shall include the additional specific items detailed in the subsections below:
    1. Contractor shall provide hard copy and electronic forms of the final test results.
    2. Contractor shall provide a document including the following:
        a. Device label/identifier
        b. Location of each drop by orientation/permanent landmark in the room
        c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

3.17 PRE-CHECKOUT

A. The Contractor shall demonstrate the following to Owner during system demonstration:
    1. The intercom stations are fully installed and functional.
    2. Calls can be placed and operate in full duplex mode.
    3. All-call functionality is working correctly.
    4. Individual zones can be paged.
    5. Integrations are functional.

3.18 FINAL ACCEPTANCE

A. In addition to closeout requirements in section 27 0000 and 27 6000, Contractor shall demonstrate the following before final approval.
    1. Owner training is complete.
    2. Punch list items are complete.
    3. As-built documentation is complete and submitted to Owner/Consultant.

3.19 ANNUAL SUPPORT AGREEMENT

A. An annual support agreement (after the 1st year full of support/warranty) shall not be part of the bid. The Contractor shall work directly with the Owner at the end of the project to determine the ongoing hardware/software support. The Contractor shall send the Consultant a copy of the support agreement for review prior to finalization.

3.20 FINAL PROCEDURES

A. Perform final procedures in accordance with section 27 0000 and 27 6000.

END OF SECTION

SECTION 27 6000
PHYSICAL SECURITY GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. Refer to Section 27 0000 for additional project scope information.
B. This section describes the general product and execution requirements related to furnishing and installing Physical Security Systems. Physical Security Systems includes Video Surveillance, Electronic Access Control, Intrusion Detection, PLC/HMI systems and their sub systems.
C. This is a 24/7/365 mission critical facility and all systems shall be capable of a 99.99% uptime by utilizing redundant power supplies, enterprise grade components, UPS power and fail over.
D. Contractor shall be responsible for providing complete and functional systems as described in this specification and project drawings.
E. Contractor shall provide low voltage power and control lines to and from power supplies, remotely controlled equipment, and other devices, even though not explicitly indicated on drawings or listed in equipment tables.
F. Contractor shall be, or Contractor shall provide, an Electrical Contractor for provision of high voltage power and conduits/raceway, where necessary.
G. Contractor shall be responsible for any and all related programming and end-user training unless noted otherwise.
H. Dallas ISD shall work directly with the district-preferred vendor to facilitate installation of access control systems and video surveillance systems, unless noted otherwise. Any work shown on the drawings pertaining to these systems are for reference only. Contractor shall provide infrastructure to support these device locations. Where the drawings indicate that security devices shall be provided by the contractor, the contractor shall utilize the district-preferred vendor to facilitate this work.
I. Contractor shall ensure that new devices being integrated into existing systems are compatible and will provide full functionality as intended by the manufacturer. New devices shall meet or exceed functionality as directed by Owner standards.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1100 – Communications Equipment Rooms
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 5100 – Distributed Communications Systems
J. Section 27 6200 – Electronic Access Control System
K. Section 27 6400 – Video Surveillance System
L. Section 27 6600 – Intrusion Detection System

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. Refer to Section 27 0000 for additional requirements.

B. Training: Programmer shall have received manufacturer-provided and/or manufacturer approved training in the configuration of the physical security system(s) being provided.
C. Certification: Programmer shall hold the highest applicable manufacturer programming certification(s) offered by the manufacturer(s) of the physical security system(s).
D. Submittal: Certification certificate shall be submitted with physical security system(s) submittals.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.
B. Hardware, Application Software, and Network Requirements: A system description including analysis and calculations used in sizing equipment required by the Physical Security Systems. The description shall show how the equipment will operate as a system to meet the performance requirements of the systems. The following information shall be supplied as a minimum:
    1. Server(s) processor(s), disk space and memory size
    2. Workstation(s) processor(s), disk space and memory size
    3. Operating System(s) Software, where software is provided or upgraded
    4. Application Software, with Optional and Custom Software Modules supplied in this project
    5. Integration Schemes: Proposed connectivity, software, development requirements, and SDK information, for inter-system communication.
    6. Network reliability requirements
    7. Number and location of LAN ports required
    8. Number of IP addresses required.
    9. Other specific network requirements, preferences, and constraints
    10. Backup/archive system size and configuration
    11. Start-up operations
    12. Description of site (field) control equipment (Controllers/Field Panels) and their configuration
    13. Access control power calculations.
    14. Battery backup requirements

1.07 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.08 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.
B. Quick-Reference Guides: Contractor shall create a concise quick-reference guide covering normal system operation and basic troubleshooting procedures for each room/system type. Length of each quick-reference guide shall be commensurate with the information needed for successful operation, subject to Owner approval.
    1. Upon Owner approval, Contractor shall provide two (2) laminated copies and one (1) digital copy for each room/system type.
C. Serial Numbers: Contractor shall provide a list of serial numbers for all supplied components with serial numbers and with a unit price greater than $99. Organize list by room/system type.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Unless noted otherwise, products in this section are intended as a basis of design and are open to substitutions per the product substitution procedures defined in Section 27 0000.

2.02 KVM

A. The contractor shall provide a KVM for each rack or cabinet housing a server or multiple servers including servers for access control.
B. The KVM shall have a 19” monitor with integrated mouse pad and keyboard.
C. The KVM shall have video inputs and USB connectors with 8 ports.
D. The KVM shall be IP enabled for remote management.
E. The contractor shall provide with a 4-post to 2-post converter (CPI #12751-719 or equal) when mounted to a 2-post rack.
F. Tripp-lite B020-U08-19-IP
    1. Or approved equal

2.03 GROUNDING AND BONDING

A. The Contractor shall bond and ground the primary protectors and the metallic member of cable sheaths to building ground utilizing a minimum of 14-awg and no greater then 6-awg at the closest point of entrance as practical, not exceeding 50 feet, in accordance with the NEC.

2.04 REFER TO INDIVIDUAL SECTIONS FOR ADDITIONAL PRODUCT INFORMATION.

2.05 FIRE STOPPING MATERIALS

A. Refer to Section 27 0000 for additional requirements.

PART 3 EXECUTION

3.01 NETWORK TIME PROTOCOL (NTP) SYNCHRONIZATION

A. All security systems as well as additional integrated systems such as intercom/PA, SQL/database servers and data logging servers shall synchronize to a common NTP server.
B. All systems including servers and workstations shall be within 250ms of each other or less depending on specific system requirements such as failover. The synchronization frequency shall be no less than every 1 hour. The Contractor shall use software such as NetTime (www.timesynctool.com) installed on the servers.
C. The Contractor shall coordinate with the Owner for a NTP server connection address.
D. Workstations on the private security network shall have an NTP client such as NetTime operating as a Windows service to sync the workstations clock to the same NTP server as the rest of the security systems.

3.02 TESTING

A. Refer to Section 27 0000 for additional requirements.

3.03 TRAINING

A. Refer to Section 27 0000 for additional requirements.
B. On-Site Training
    1. General: Present, review and describe equipment and materials to the Owner and Owner's operating personnel and fully demonstrate the operation and maintenance of the systems, equipment and devices specified herein.
    2. Include with new systems, Contractor to arrange and provide for video recording of each onsite training session.
        a. Provide professional video and audio recording of each software screen option with Owner approval of content.
        b. Provide end user video recording for all training levels.
    3. Training shall comprise two separate levels of training;
        a. User Group upon substantial completion of the project.
            1) User group training shall include a site/building walk through indicating locations of equipment and their usage.
            2) User group training shall include the operation of workstation capability of system monitoring, command override and report generation.

b. Maintenance Group upon completion of the project prior to close out.
    1) Maintenance group training shall include a site/building walk through indicating locations of equipment and their usage at up to six representative sites.
    2) Review of a-build documentation at each controller location.
    3) Troubleshooting techniques in hardware and software.
4. The training shall cover the overall system, each individual system, each subsystem, and each component. The training shall also cover procedures for database management, normal operations, and failure modes with response procedures for each failure. Each procedural item shall be applied to each equipment level.

C. Duration: Refer to the individual sections for the minimum time requirements.

3.04 WARRANTY

A. Refer to Section 27 0000 for additional requirements.
B. Furnish and guarantee maintenance, repair and inspection service for the system using factory trained authorized representatives of the manufacturer of the equipment for a period of one year after final acceptance of the installation.
C. Third Party Device warranties are transferred from the manufacturer to the Contractor, which may then transfer third party warranties to the Owner. Specific third party warranty details, terms and conditions, remedies and procedures, are either expressly stated on, or packaged with, or accompany such products. The warranty period may vary from product to product. These products include but are not limited to devices that are directly interconnected to the field hardware or computers and are purchased directly from the manufacturer.
D. Purpose
    1. The Contractor shall repair any system malfunction or installation deficiency discovered by the Owner or their representatives during the burn in and warranty period.
    2. The Contractor shall correct any installation deficiencies found against the contract drawings and specifications discovered by the Owner or their representatives during the warranty period.

3.05 EXAMINATION OF SITE AND DOCUMENTS

A. Bidder shall examine all documents, shall visit the site(s) prior to submitting proposal, record their own investigations, and shall inform themselves of all conditions under which the Work is to be performed at the site(s) of the Work, including the structure of the ground, the obstacles that may be encountered, and all of the conditions of the documents, including superintendence of the Work, requirements of temporary environmental controls, the time of completion, list of Subcontractors, and all other relevant matters that may affect the Work or the proposal process.
B. Verify cable lengths comply with published standards.
C. Notify Owner/Consultant of installation that would exceed maximum lengths prior to installation of cable.
D. Contactor shall consult with Owner/Consultant regarding alternative routing or location of cable.
E. Do not proceed until unsatisfactory conditions have been corrected.
F. Failure to make the examination shall not result in any Change Order requests.
G. The Bidder shall base the proposal on the site(s) examination, materials complying with the plans and specifications and shall list all materials where the proposal form requires.
H. The commencement of work by the Contractor shall indicate acceptance of existing conditions, unless a written notice of exceptions has been provided to the Owner/Consultant prior to commencement.
I. If the Contractor observes, during preliminary examinations or subsequent work, existing violations of fire stopping, electrical wiring, grounding, or other safety- or code-

related issues, the Contractor shall report these to the Owner/Consultant in a timely manner.

3.06 SPARE PARTS

A. Licenses
B. Cameras
C. Card Readers

3.07 INSTALLATION REQUIREMENTS

A. Refer to Section 27 0000 for additional requirements.
B. Contractor shall furnish and install all cables, connectors, and equipment as shown on Drawings and as specified herein.
C. It is the Contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified. This includes any modifications required to route and conceal horizontal distribution wiring.
D. Beginning installation means Contractor accepts existing conditions.
E. The Contractor shall be responsible for identifying and reporting to the General Contractor any existing damage to walls, flooring, tiles, and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway, or other hardware shall be repaired by the Contractor.
F. Repairs shall match preexisting color and finish of walls, floors, and ceilings. Any Contractor-damaged ceiling tiles, floor, and carpet shall to be replaced to match color, size, style, and texture.
G. Where unacceptable conditions are found, the Contractor shall bring this to the attention of the construction supervisor immediately. A written resolution will follow to determine the appropriate action to be taken.
H. All wiring shall be run "free-air," in conduit, in a secured plastic raceway or in modular furniture as designated on the Drawings. All cable shall be free of tension at both ends. PLENUM rated cable shall be used in areas used for air handling.
I. Avoid abrasion and other damage to cables during installation.
J. The cable system will be tested and documented upon completion of the installation as defined in the section below.
K. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by manufacturers or as indicated in their published literature, unless specifically noted herein to the contrary.

3.08 COOPERATION

A. The Contractor shall cooperate with Consultant's and Owner's personnel in locating work in a proper manner.
B. Should it be necessary to raise, lower, or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

3.09 COMMISSIONING SUBMITTALS

A. Provide the following to the Owner no later than 30 days prior to system commissioning/programming.
    1. Commissioning Test Plan and Check-Off List: Specified elsewhere in this document.
    2. Software: One set of fully functional software in manufacturer's original media packaging, temporarily licensed for a 30-day evaluation period.
    3. Web-based Training: Access to web-based training modules.

3.10 COMMISSIONING

A. Provide programming and commissioning for each system as described in individual sections below.

B. Contractor shall develop and submit a plan for coordination of settings and programming issues with the Consultant and Owner no later than 30 days prior to performing programming and commissioning.
C. The security Contractor is required to place entire system into full and proper operation as designed and specified.
D. Verify that all hardware components are properly installed, connected, communicating, and operating correctly.
E. Verify that all system software is installed, configured, and complies with specified functional requirements.
F. Perform final acceptance testing in the presence of Owner's representative, executing a point-by-point inspection against a documented test plan that demonstrates compliance with system requirements as designed and specified.
    1. Submit documented test plan to Owner at least 14 days in advance of acceptance test, inspection, and check-off.
    2. Conduct final acceptance tests in presence of Owner's representative, verifying that each device point and sequence is operating correctly and properly reporting back to control panel and control center.
    3. Acceptance by Owner is contingent on successful completion of check-off; if check-off is not completed due to additional work required, re-schedule and perform complete check-off until complete in one pass, unless portions of system can be verified as not adversely affected by additional work.
    4. The system shall not be considered accepted until all acceptance test items have been successfully checked-off. Beneficial use of part or all of the system shall not be considered as acceptance.

3.11 OPERATION AND MAINTENANCE MANUALS

A. Part One: Notwithstanding requirements specified elsewhere, submit the following labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation:
    1. Record Drawings: Submit two (2) copies of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, conduit routing, wiring and relationships as they were constructed. Include nomenclature showing as-built wire designations and colors. Drawings shall include room numbers coinciding with Owner space planning numbering. Drawings shall be submitted in electronic editable AutoCAD 2018 files, in ".dwg" format, on a digital storage medium.
    2. Manuals: Submit two (2) copies of each of the following materials in bound manuals, or electronic PDF copies, with labeled dividers:
        a. A final Bill of Material for each system
        b. Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.
        c. Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals and service sheets published by the manufacturers of the components, devices and equipment provided.
        d. Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.
        e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.
        f. Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.
        g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturer's Warranty Registration papers as described herein.

B. Part Two: Within fourteen (14) days of receipt of Consultant reviewed Operating and Maintenance Manual (Phase One), submit three (3) electronic copies in AutoCAD 2018 editable .dwg format of the reviewed Record Drawings and three (3) copies of the reviewed Operating and Maintenance Manuals to the Owner, in digital format.
    1. Within each equipment enclosure and/or terminal cabinet, the Contractor shall place a Single Line drawing of the system(s) and the respective Terminal Cabinet Wiring Diagram in a clear plastic sleeve permanently attached to the inside cover of the terminal cabinet.
    2. In each equipment enclosure the Contractor shall place a drawing providing device locations served by the equipment within the enclosure with identification that is identical to the wiring tags and with the software description of each point.
    3. The Contractor shall provide to the Owner one (1) copy of new administration and user software, including required graphical maps, in digital format.
C. Sufficient information, (detailed schematics of subsystems, assemblies and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.

3.12 CLOSEOUT PROCEDURES

A. Notification: Contractor shall provide written notification to Architect/Consultant and Owner when Contractor is satisfied that the work has been completed and is ready for inspection.
B. Closeout Submittals: Contractor shall provide closeout documentation to the Architect/Consultant. The Architect/Consultant shall receive the closeout submittals no less than 72 hours prior to the scheduled inspection time.
C. Inspection: Contractor shall be present for the inspection by the Architect/Consultant. Contractor shall supply all testing equipment needed to verify compliance with the specifications found in Bid package.
D. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in the Bid package, and/or unacceptable to the Architect/Consultant shall be documented by the Architect/Consultant and provided to Contractor to rectify.
E. Re-Inspection: If a re-inspection is necessary, the costs of the Architect/Consultant's additional travel, hours, and expenses may be deducted by the Owner from the contract amount due Contractor.
F. Punch List Approval: The punch list shall be considered complete only after having been signed by the Owner and Architect/Consultant.
G. The system has successfully completed a 30-day performance period.
H. Payment Authorization: Final payment will be authorized only after all closeout procedures and requirements have been followed and fulfilled by Contractor and approved in writing by the Owner and Architect/Consultant, including punch list(s) and/or re-inspection(s).

3.13 SERVICE CONTRACT

A. The service contract shall cover equipment and software related to this contract, and shall provide for the following parts and services, without additional cost to the Owner:
    1. Bi-yearly inspections, preventative maintenance and testing of equipment and components in Year One of the warranty period.
    2. Annual inspections, preventive maintenance, and testing of equipment and components in Years Two and above of the warranty period.
    3. Regular Service, Emergency Service, and Call-Back Service
    4. Labor and Repairs
    5. Equipment, and Materials and transportation cost.
B. Response Time: Response time for service calls.

1. Emergency service calls where system is not responding to staff directed commands through the computer systems shall be within 2 hours to the project site.
2. Emergency service calls where controllers are not reporting shall be within 2 hours to the project site.
3. Normal service calls for device malfunctions shall be within 24 hours during normal working hours to the site.

C. Repair Time: Contractor shall stock parts in sufficient quantities such that repair or replacement shall be guaranteed within 12-hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality, and provided permanent replacement is achieved within 72 hours. Contractor may contact Owner representative for use of Owner supplied spare parts where delay of system repair will have negative impact on system performance.
D. Commencement: The warranty begins at the time of issuance of the statement of "Final Acceptance of the Installation" by the Owner.
E. Transferability: The warranty shall be transferable to any person or persons at the discretion of the Owner.
F. Transmittal: A copy of this Warranty shall be delivered to, and signed for by the Owner's representative whose primary responsibility is the operation and care of these systems. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.
G. Registration: Register Warranty papers for all equipment and software in the name of the Owner. Furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.
H. Subcontracting: Warranty service work may not be subcontracted except with specific permission and approval by the Owner.
I. Resolution of Conflicts
    1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory, stating specific areas of dissatisfaction in writing.
    2. If the Contractor or his approved Subcontractor does not resolve such stated areas of dissatisfaction within thirty (30) days, the Owner may appoint any alternative service agency or person to fulfill the terms of the Warranty; the cost of which shall be borne by the Contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

END OF SECTION

SECTION 27 6200
ELECTRONIC ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.01 SCOPE

A. This specification section covers the furnishing and installation of a new and complete enterprise-wide, low-voltage, Electronic Access Control System (EACS).
B. Contractor shall furnish and install access control hardware devices, mounting brackets, power supplies, switches, controls, consoles and other components of the system as shown and specified.
C. Contractor shall furnish and install access control related software to allow this system expansion. Software includes required license addition for access control readers and electrified portals, workstations and required physical security system Integration.
D. Furnish and install outlets, junction boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation. Requirements shall be in accordance with Division 26 0000, Electrical.
E. Refer to Section 27 0000 for additional project scope information.

1.02 PRECEDENCE

A. Obtain, read and comply with General Conditions and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable sub-section and directions as contained herein, this section shall govern.

1.03 RELATED WORK

A. Division 08 - Door Hardware
B. Division 14 - General Elevator Requirements
C. Section 27 0000 – General Technology Requirements
D. Section 27 0500 – Communications General Requirements
E. Section 27 0523 – Pathways for Technology Systems
F. Section 27 0526 – Grounding and Bonding for Technology Systems
G. Section 27 1100 – Communications Equipment Rooms
H. Section 27 1500 – Communications Horizontal Cabling
I. Section 27 1600 – Communications Connecting Cords
J. Section 27 1800 – Communications Labeling and Identification
K. Section 27 5100 – Distributed Communications Systems
L. Section 27 6000 – Physical Security General Requirements
M. Section 27 6400 – Video Surveillance System
N. Section 27 6600 – Intrusion Detection System

1.04 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.05 REFERENCE STANDARDS AND CODES

A. IEC 60839-11-5:2020 - Open Supervised Device Protocol (OSDP)
B. Refer to Section 27 0000 for additional requirements.

1.06 QUALIFICATIONS

A. Lock installers for fire rated doors are to be trained and certified by the manufacturer via Intertek Qualified Personnel (IQP) Raceway and Hardware Installer Program on the proper installation and adjustment of fire, life safety, and security products in compliance with NFPA 80 including: hanging devices; locking devices; closing devices; and seals.
    1. Trained and qualified raceway installers are required to ensure modifications do not affect the integrity of fire doors. Doors must remain compliant with NFPA 80.

B. Refer to Section 27 0000 for additional requirements.

1.07 PRE-CONSTRUCTION SUBMITTALS

A. The Contractor shall submit the access control hardware layouts which includes the number of controllers, sub-panels and other associated devices per location.
B. The Contractor shall submit full power calculations which includes the anticipated power loads, number and type of power supplies including all power supply boards, number of 120VAC circuits required, battery backup including the quantities of batteries to meet requirements, PoE loads, fire alarm connection requirements, etc.
C. Refer to Section 27 0000 and 27 6200 for additional requirements.

1.08 PRE-INSTALLATION PROCEDURES

A. For in-use, existing facilities or retrofit projects, the Contractor shall assign all applicable electronics IP addresses, passwords and pre-build out all the enclosures including the interconnects within the enclosure prior to being delivered to the project or installed.
B. The Contractor shall cable all controlled or monitored doors, intercoms, etc. and terminate this cable in the access control panels no less than 3 weeks prior to substantial completion regardless of the status of the field devices such as door hardware, card readers, intercoms, etc.
C. The Contractor shall program the access control system no less than 2 weeks prior to substantial completion so when field devices are installed and terminated, associated door hardware and full system functionality can be tested. Programming shall include all doors, associated inputs, outputs, and interoperability regardless of final field device status.
D. The Contractor shall perform final connections and testing onsite when field devices such as electrified door hardware has been installed.
E. Refer to section 27 0000 and 28 0000 for additional requirements.

1.09 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 requirements.

1.10 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Any devices intended for interconnection to the existing access control system (ACS) shall match or be an upgrade for existing devices of similar type and functionality. No substitutions are allowed.

2.02 ELECTRONIC ACCESS CONTROL HARDWARE

A. New ACS hardware shall match existing ACS hardware.
B. In the case that new ACS hardware that matches existing ACS hardware cannot be obtained, the contractor shall provide new hardware that is a direct upgrade or manufacturer-recommended replacement.

2.03 CARD READERS

A. New card readers shall match existing ACS card readers.
B. In the case that new matching card readers cannot be obtained, the contractor shall provide new card readers that are a direct upgrade or manufacturer-recommended replacement.

2.04 SURGE PROTECTION FOR WIEGAND COMMUNICATION

A. The Contractor shall provide a surge protector for all exterior card readers not directly attached to a building which would include any pedestal mounted reader, gate reader or any other exposed reader potentially prone to surges.

B. Mount unit outside of the access control/power supply panels. Provide with appropriate mounting and enclosures as required.
C. There shall be a minimum of a 36” shielded cable from the surge protector to the device to allow for adequate clamping time.
D. When protector is mounted in interior, dry or weather sealed enclosure:
    1. Nominal voltage rating of 12V AC/DC. Provide correct module per required voltage level if different from 12V.
    2. 20,000A surge current rating.
    3. Protects 2-pair per module.
    4. Accepts up to 10AWG cable
    5. Connect directly to ground.
    6. UL 497B listed
    7. Provide quantity of modules as required for the application.
    8. Provide base mounting plate as required for the application.
    9. Manufacturer:
        a. Ditek DTK-2MB Mounting Base
        b. (2) Ditek DTK-2MHLP12B Surge Modules
        c. Or approved equal

2.05 SURGE PROTECTION FOR LOW VOLTAGE AC/DC POWER

A. The Contractor shall provide a surge protector for all exterior devices being supplied by low voltage power. This does not include devices directly connected to a building where the risks of surges are negligible.
B. There shall be a minimum of a 36” shielded cable from the surge protector to the device to allow for adequate clamping time.
C. When protector is mounted in interior, dry or weather sealed enclosure:
    1. Nominal voltage rating of 24V AC/DC. Provide correct module per required voltage level if different from 24V.
    2. 20,000A surge current rating.
    3. Protects 2-pair per module.
    4. Accepts up to 10AWG cable
    5. Connect directly to ground.
    6. UL 497B listed
    7. Provide quantity of modules as required for the application.
    8. Provide base mounting plate as required for the application.
    9. Manufacturer:
        a. Ditek DTK-2MB Mounting Base
        b. Ditek DTK-2MHLP24B Surge Module
        c. Or approved equal

2.06 SURGE PROTECTION FOR 120 VAC POWER

A. The Contractor shall provide a surge protector for all 120VAC supplied panels and enclosure when there is a critical risk of surges. This does not include interior panels which only serve interior devices or devices connected directly to a building where the risks of surges are negligible.
B. There shall be a minimum of a 36” of cable from the surge protector to the load to allow for adequate clamping time.
C. Exterior, enclosure or other mounted:
    1. Nominal voltage rating of 120VAC, single-phase, 20A continuous load.
    2. Parallel connected.
    3. 50,000 A surge current rating.
    4. UL 1449 Type 1 SPD listed
    5. LED indicator.
    6. NEMA 4X rated.
    7. Maintain a minimum of 3’ of cable from the surge protector to the load.
    8. Manufacturer:

a. Ditek DTK-120HW
b. Or approved equal

D. Interior, wall mount:
1. Nominal voltage rating of 120VAC, single-phase, 20A continuous load.
2. Series connected.
3. 54,000 A surge current rating.
4. 35db of EMI/RFI filtering.
5. UL 1449 Type 2 SPD listed
6. UL 1289 EMI/RFI Noise Filtering listed.
7. LED indicator.
8. Form C dry contacts for remote monitoring.
9. Include with NEMA 4X enclosure.
10. Maintain a minimum of 3’ of cable from the surge protector to the load.
11. Manufacturer:
a. Ditek DTK-TSS4D
b. Or approved equal

2.07 POWER SUPPLIES AND ACCESS CONTROL ENCLOSURES

A. Provide a power supply/chargers and sub-assemblies to power various access controller boards, locking hardware and other access control or security system components. The Contractor shall select the appropriate enclosure, power supply and sub-assemblies for each application. The Contractor shall include network monitoring modules for all power supplies.

B. Enclosures
1. Shall be capable of accommodating power supplies, sub-assemblies and other manufactures access control controller boards when required.
2. Wall mountable.
3. Include a cam-lock and tamper switch.
4. Trove 2 enclosures when housing access control electronics.
5. eFlow or Maximal enclosures when only power supply components will be within the enclosure.

C. Power Supplies
1. 115 VAC input
2. 12VDC or 24VDC selectable outputs at:
a. 4 amp continuous power @ 12VDC or 24VDC.
b. 6 amp continuous power @ 12VDC or 24VDC.
c. 10 amp continuous power @ 24VDC.
3. High capacity battery charging circuit.
4. Form “C” supervision contacts for AC Low, AC Fail, and battery presence.
5. Supervised Fire Disconnect.
6. Low power Disconnect.
7. Class 2 aux. output.
8. UL 294 listed sub-assembly for access control.

D. Batteries
1. The Contractor shall provide a minimum of (2) 12V, 7ah, sealed Absorbent Glass Mat (AGM) style batteries with F style terminals per power supply.
2. Provide adequate battery backup as required by Authority Having Jurisdiction (AHJ) or a minimum of 4-hours.
3. Manufacturer:
a. Interstate Power Patrol FAS1075
b. Power Sonic PS-1270
c. Or approved equal

E. Sub-Assemblies
1. The Contractor shall provide all sub-assemblies to meet the project requirements

2. Access Control Module
    a. Independently controlled fused protected outputs:
        1) Fail-Safe and/or Fail-Secure power outputs.
        2) Dry form “C” 5 amp rated relay outputs (fused).
        3) Any combination of the above
3. Access Control System trigger inputs:
    a. Normally open (NO) inputs.
    b. Open collector sink inputs.
    c. Any combination of the above.
4. Fire Alarm Disconnect:
    a. Individually selectable for any or all outputs.
    b. Latching or non-latch input FACP disconnect.
    c. Normally open (NO), normally closed (NC) dry contact or polarity reversal from FACP signaling circuit trigger input.
    d. LED indicates that the Fire Alarm Disconnect has been activated.
    e. Form “C” relay output for auxiliary reporting.
5. Multi-Output Power Distribution Module
    a. Single input distributed over eight (8) outputs.
    b. Fused protected outputs.
    c. Output terminals shall accommodate up to 12AWG wires.
6. Multi-Output Power Distribution Module with Dual Inputs
    a. Two (2) inputs distributed over eight (8) outputs.
    b. Outputs shall be configurable by input.
    c. Fused protected outputs.
    d. Output terminals shall accommodate up to 12AWG wires.
7. Network Communication Modules
    a. Power Supply Network Interface
        1) Interface for up to two (2) eFlow power supply/chargers.
        2) Two (2) Network controlled From “C” relays.
        3) Event timers.
    b. Network Power Distribution Module
        1) Two (2) inputs distributed over eight (8) outputs.
        2) Outputs shall be configurable by input.
        3) Fused protected outputs.
        4) Emergency disconnect interface by output.
        5) Selectable battery back-up by output.
        6) Output terminals shall accommodate up to 12AWG wires.
    c. Common monitoring features
        1) Network interface via LAN/WAN.
        2) Centralized dashboard for monitoring all power supplies. Provide appropriate hardware/software required.
        3) Remote reporting of status via email and/or SNMP trap messaging.
        4) AC, low battery and battery presence monitoring.
        5) Alert messages of System Service required.
        6) System log.
        7) On demand determination of system status.
        8) Reset of individual outputs as required for remote diagnostics.
        9) Monitor enclosure temperature.
        10) Static or DHCP IP address configuration.
        11) SSL Secure Sockets Layer encryption.
8. Voltage Regulator
    a. The Contractor shall provide a voltage regulator to provide constant 5VDC or 12VDC outputs for access control boards, modules or other applicable components as well as a voltage regulator for door hardwiring or controllers requiring 12VDC.
    b. 24vdc Input.

c. Selectable 5 or 12VDC output.
d. Output rating of 6amp max.
e. Stackable with both Networkable and dual input power distribution modules for space savings.

9. Power supplies and sub-assemblies shall be manufactured by Altronix or approved equal:
   a. eflow4NB - 4amp 12vdc/24vdc power supply (UL listed Sub-assembly).
   b. eFlow6NB - 6amp 12vdc/24vdc power supply (UL listed Sub-assembly).
   c. eFlow104NB - 10amp 24vdc power supply (UL listed Sub-assembly).
   d. ACM8 - Eight (8) output, fused Access Control Module (UL listed Sub-assembly).
   e. ACMS8 – Dual input, eight (8) output, fused Access Control Module (UL listed Sub-assembly).
   f. Linq2 - Network Communication Module (UL listed Sub-assembly).
   g. Linq8PD - Dual input, eight (8) output, fused Network Communication Module (UL listed Sub-assembly).
   h. PDS8 - Dual input, eight (8) output, fused power distribution module (UL listed Sub-assembly).
   i. VR6 - Voltage Regulator (UL listed Sub-assembly).

2.08 HIGH CURRENT POWER SUPPLIES FOR ELECTRIC LATCH RETRACTION

A. 115 VAC input, 6.3A.
B. (2) 20VDC to 26.4VDC individually controlled lock outputs.
C. Provides up to 15 amps for up to 300ms for high inrush applications and up to .75 amps continuous holding current.
D. Auxiliary 12VDC always on output up to .75A.
E. High capacity battery charging circuit.
   1. Provide adequate battery backup as required by Authority Having Jurisdiction (AHJ) or a minimum of 1-hour when power supply is not connected to a UPS circuit.
F. (2) Normally Open trigger inputs.
G. Normally closed FACP trigger input.
H. Trouble relay output indicating low DC output voltage.
I. UL 294 listed sub-assembly for access control.
J. Include with lockable enclosure.
K. Provide with appropriate gauge wire to allow for remote mounting according to manufacturer’s recommendations.
L. Manufacturer:
   1. Altronix StrikeIt1
   2. Or approved equal

2.09 CABLING

A. Provide cabling per manufacturer’s recommendations and code requirements for riser rated, plenum, and non-plenum cable types.
B. UTP data cabling required will be provided, installed, terminated and tested by the Division 27 structured cabling Contractor.
C. UTP patch cables will be provided and installed by the Owner in the IDF and provided by Owner and installed by Contractor at the door. The EACS Contractor shall provide the Owner a list of patch cable lengths at the door side.
D. Wiegand cables for electronic access-controlled doors shall be a composite bundled cable and include the following cables and conductor counts:
   1. Card reader, Wiegand – 6 conductor, 22 awg shielded.
   2. Lock power – 4 conductor, 18 awg unshielded.
   3. Door contact – 2 conductor, 22 awg unshielded
   4. Request to exit and/or latch detection/spare – 4 conductor, 22 awg unshielded

E. Manufacturer (Wiegand):
   1. Belden (Wiegand) #658AFS
   2. General Cable (Wiegand) #4EPL1S
   3. Superior Essex (Wiegand) #AC-A1x-68
   4. Or approved equal

F. OSDP cables for electronic access-controlled doors shall be a composite bundled cable and include the following cables and conductor counts:
   1. Card reader, OSDP – 2 conductor stranded, twisted, 24 awg, 100% foil shield with 90% tinned copper braid shield with drain, 120 ohm nominal impedance, 12.5 pF/ft capacitance, designed for RS-485.
   2. Card reader power - 2 conductor, 18 awg unshielded, may be within same jacket as card reader cable.
   3. Lock power – 4 conductor, 18 awg unshielded.
   4. Door contact – 2 conductor, 22 awg unshielded
   5. Request to exit and/or latch detection/spare – 4 conductor, 22 awg unshielded

G. Manufacturer (OSDP):
   1. Belden – #Y66871
   2. Sterling Wire and Cable - #SWC-8920
   3. Paige Datacom - #236750807
   4. Windy City Wire - #4461030-OSDP
   5. Or approved equal

H. Cables for RS-485/OSDP in panel or remote controller or secondary card reader shall be: 2 conductor stranded, twisted, 24 awg, 100% foil shield with 90% tinned copper braid shield with drain, 120 ohm nominal impedance.
   1. Manufacturer:
      a. Belden #82841
      b. Or approved equal

I. OSDP cables for electronic access-card reader only doors not requiring composite cabling such as secondary/daisy-chained OSDP card readers shall be:
   1. Card reader, OSDP – 2 conductor stranded, twisted, 24 awg, 100% foil shield with 90% tinned copper braid shield with drain, 120 ohm nominal impedance, designed for RS-485.
   2. Card reader power - 2 conductor, 18 awg unshielded
   3. Manufacturer (OSDP):
      a. Sterling Wire & Cable # S182241PRS-10
      b. Or approved equal

J. Cables for PoE locks shall be installed by the Division 27 cabling contractor. Horizontal cable shall be terminated above the door within a j-box to provide a disconnect point for the patch cable to the PoE hinge.

2.10 DOOR CONTACTS/DOOR POSITION SWITCHES (DC)

A. All doors with card readers and all doors shown for monitored only shall have a door position switch. When the door position switches are not shown in the Division 08 specifications, the security contractor shall furnish and install them. The Security Contractor shall be responsible for the connection of all door position devices to the access control system and other systems if sharing the same door position switch. Door position devices shall be integral to the door hardware whenever possible. The Contractor shall refer to the door hardware schedule and coordinate with the door hardware Contractor on locations and requirements.
B. Sealed and potted magnetic reed switch in contact housing.
C. Provide DPDT for applications with multiple security systems (Access Control/Intrusion Detection or PLC) utilizing a single door contact.
D. Door contacts shall be appropriately sized for any established holes within door frames.

E. Parts provided are basis of design. Determination of final part number is the responsibility of Contractor.
F. Provide color that matches door as close as possible.
G. Provide recessed switch whenever possible.
H. Provide armored whip for surface mount contacts.
I. Provide with a 1k/2k end of line (EoL) pre-built resistor pack. GRI (George Risk Industries, Inc.) 6644 series or approved equal.
J. Provide GRI (George Risk Industries, Inc.) 180 Series for recessed applications.
    1. Magnasphere
    2. Nascom
    3. Or approved equal.
K. Provide GRI (George Risk Industries, Inc.) 4400 series for surface mount applications.
    1. Magnasphere
    2. Nascom
    3. Or approved equal.
L. Provide GRI (George Risk Industries, Inc.) MC-180 Series for hollow top channel applications.
    1. Magnasphere
    2. Nascom
    3. Or approved equal.
M. Provide GRI (George Risk Industries, Inc.) 4532 Series for overhead door applications.
    1. Magnasphere
    2. Nascom
    3. Or approved equal.

2.11 REQUEST TO EXIT (REX) DEVICES

A. All doors with card readers shall have a request to exit with the exception of doors with a card reader in and a card reader out. When integrated request to exit devices are not shown in the Division 08 specifications, the security contractor shall furnish and install motion-based request to exit devices. The Security Contractor shall be responsible for the connection of all request to exit devices integral to the door, motion based or other to the access control system. Request to Exit devices shall be integral to the door hardware whenever possible. The Contractor shall refer to the door hardware schedule and coordinate with the door hardware Contractor on locations and requirements. Motion based Request to Exit devices shall only be used when not available in the door hardware.
B. Provide with a 1k/2k end of line (EoL) pre-built resistor pack when utilized to release doors with magnetic locks or other high security applications. GRI (George Risk Industries, Inc.) 6644 series or approved equal.
C. Independent adjustable beam pattern.
D. Provide with mounting plate or wall mounting plate to mount over a single-gang backbox when required.
E. Provide white or black color that matches door as close as possible.
F. (2) Form C relay contacts each rated 1 A at 30 VAC or VDC for resistive loads.
G. DC Power draw: 39mA max @ 12 VDC.
H. Dimensions: 1.8”H x 6.75”W x 1.75”D.
I. Utilize contact closure REX hardware built into the handle or crashbar whenever possible.
J. Provide Bosch DS160/161
    1. Provide with TP160/161 mounting plate when mounted over a backbox.
    2. Or approved equals.

2.12 ELECTRIFIED HARDWARE (EH)

A. The Security Contractor shall be responsible for the connection of all electrified hardware to the access control system. This shall include providing centralized power supplies located next to or integral to the access control panels. The Contractor shall coordinate with the door hardware specifications and schedules for additional information.

2.13 ADA POWER ASSIST DOOR OPERATOR INTEGRATION RELAYS

A. The Contractor shall provide all necessary relays to interface to the ADA operators at access-controlled doors with ADA door operators. The ADA operator interface shall be managed by the access control system. Local “smart relays” are not allowed.
B. Hardwired paddles
    1. Provide with a DPDT relay. Replace existing relay in paddle as necessary.
    2. Manufacturer:
        a. Altronix RB1224
        b. Or approved equal
C. Wireless paddles
    1. Provide with DPDT wireless relay transmitter and receiver. Replace existing relay in paddle as necessary.
    2. Manufacturer:
        a. Larco Atek 234475 transmitter and Larco Atek 233804 receiver
        b. Or approved equal

2.14 DOOR RELEASE BUTTON, UNDER COUNTER

A. SPDT, momentary push button
B. Guard ring around button to prevent accidental activation
C. Mount with button facing back of desk
D. Coordinate exact mounting location after deck or counter is fully complete and the sitting position has been decided.
E. Manufacturer:
    1. Alarm Controls TS-18
    2. Or approved equal

2.15 PANIC/DURESS/LOCKDOWN BUTTONS

A. Exact device type and style to be coordinated with Owner prior to approval or purchase. A selection of button options shall be presented to the Owner for review.
B. Button shall be hardwired.
C. Provide with a 1k/2k end of line (EoL) pre-built resistor pack. GRI (George Risk Industries, Inc.) 6644 series or approved equal.
D. Buttons within a single space may be wired in parallel and be programmed as a zone.
E. Manufacturer:
    1. Under desk – Honeywell 269R
    2. Wall push type – STI-USA Stopper Station #SS2432LD-EN
        a. Blue, flush cover, latching with key to unlock, Text = LOCKDOWN. Coordinate exact text to use with Owner prior to purchase. Provide with appropriate power supply connection for illumination.
    3. Or approved equals
F. Include a minimum of $50 per device allowance to select a button style during the project based on each locations needs.

2.16 MAGNETIC DOOR HOLDS

A. The Security Contractor shall be responsible for the connection of all electrified magnetic door hold open intended for security to the access control system. This shall include providing centralized power supplies located next to or integral to the access control panels. The Contractor shall coordinate with the door hardware specifications and schedules for additional information.

B. Die cast housing
C. Mounting options include:
    1. Floor-mounted
    2. Recessed wall-mounted
    3. Surface wall-mounted
D. 35 pound holding force
E. Fail-safe
F. 24V powered
G. UL listed
H. Manufacturer:
    1. Allegion LCN
        a. Sentronic SEM 7800 Series
        b. Coordinate finish options with Owner, Architect and Consultant.
        c. Provide appropriate mounting options as required.
        d. Provide with appropriate extensions as required.
            1) LCN SEM series for short length extensions, stack as required.
            2) Edwards 1500 series for mid length extensions.
            3) Utilize mag hold open extension chains for long extensions.
            4) Floor mounting may be required when other options to not work.
    2. Assa Abloy Rixon
    3. Or approved equal

2.17 IP SIP SINGLE/DUAL/QUAD BUTTON INTERCOM WITH INTEGRATED IP CAMERA

A. Exterior rated with vandal proof housing.
B. 1, 2 or 4 illuminated programmable buttons capable of calling one, two or four different extensions.
C. NEMA 4X, IP 69 rated.
D. IK10 impact resistance rated.
E. PoE or 12 VDC powered.
F. (2) relays for device control and monitoring. An output shall be connected to the access control system headend for remote door unlock via DTMF.
G. QoS support. The Contractor shall configure the unit for QoS and use a DSCP value of 46 for audio and 32 for streaming video.
H. Supports NTP time synchronization. The Contractor shall coordinate with the Owner to obtain the NTP IP address to configure the unit.
I. Contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software.
J. Be equipped with an integrated event functionality, which can be triggered by: video motion detection, button press, DTMF, audio, schedule, camera tampering, embedded third party applications, external input, audio detection, edge storage disruption detection, ect. The camera shall provide memory for pre & post alarm recordings. Event functions shall be configurable via the web interface.
K. IEEE 802.1X (Authentication) compliant.
L. Provide with appropriate surface mount backbox based on field conditions. Do not recess mount.
M. TR069 capable with cloud monitoring and provisioning service.
N. Provide an additional 22awg, 2-conductor cable from the access control headend to each intercom for door unlock integration.
O. Integrated Intercom specifications:
    1. SIP VoIP compliant
    2. Supports peer to peer mode.
    3. Support multiple profiles for SIP mode and peer to peer mode. The Contractor shall set up a peer to peer profile for direct communication to a SIP enabled VoIP video phone intercom master station.

4. Capable of dialing up to 3 independent extensions for group or roll over.
5. 2-way, full duplex audio
6. AAC-LC audio encoding @ 16 kHz.
7. 94 db audio output over integrated speaker.
8. Built-in echo cancellation and noise reduction.

P. Integrated camera specifications:

1. Be designed to provide at least two simultaneous video streams in all resolutions, simultaneous including a SIP video stream, at a selectable range up to 30 frames per second (60Hz mode) using H.264 or MJPEG.
2. Support the following video resolutions: 160x90 to 640x480.
3. 135 degrees horizontal by 109 degrees vertical field of view.
4. Integrated LED for illumination.
5. ONVIF Profile S compliant.
6. Provide with (1) Video Management System license per intercom to record the integrated camera.

Q. Manufacturer and Model:

1. 2N/Axis IP Force 1-button #01337-001
2. 2N/Axis IP Force 2-button #01340-001
3. 2N/Axis IP Force 4-button #01343-001
4. Provide with (1) Gold license #01380-001 for each intercom
5. Provide with Torx security screws #01345-001

2.18 IP SIP INTERCOM MASTER STATION DESK PHONE

A. IP SIP compliant VoIP desk phone with color LCD screen for intercom calling.
B. 16 lines and up to 16 SIP accounts.
C. 1024x600, 7” capacitive 5-point touch screen.
D. Android 7.0 operating system with Google Play Store and 3rd party application support.
E. Dual switched, auto-sensing 10/100/1000Mbps ethernet ports.
F. PoE/PoE+ powered.
G. Dual band, 802.11 (2.4 GHz and 5 GHz) Wi-Fi capable.
H. TLS 1.2, SRTP and HTTPS encryption.
I. TR069 capable with cloud monitoring and provisioning service.
J. Integrated Bluetooth 4.0 with EDR.
K. RJ9 headset jack, USB port and 3.5mm stereo headset with microphone.
L. Programmable DTMF soft button overlay on video calls.
M. Integrated 720P video camera.
N. Integrated H.264 video decoder up to 720P at 30 FPS not to exceed 2Mbps.
O. Can receive and display H.264 IP video on 7” color display.
P. Manufacturer and Model:

1. Grandstream GVX3370 (Axis #01695-001)
2. No substitutions without prior approval.

2.19 DOOR LOOPS (POWER TRANSFER LOOPS)

A. Provide new power transfer loops at the top of the doors for retrofit applications.
B. Provide all necessary materials and labor to connect existing electrified panic hardware and new access control system where appropriate.
C. Power transfer loop shall be armored stainless steel door loop with metal end caps.
D. Minimum interior diameter of 3/8” and exterior diameter of 1/2”.
E. Field verify the lengths required for each door.
F. Provide RCI #9508.

1. Or approved equal.

PART 3 EXECUTION

3.01 PHYSICAL SECURITY SYSTEMS AND INTERCOM INTEGRATION

A. The electronic access control system shall be integrated with the video surveillance system and intrusion detection system.
   1. The access control/intrusion detection interface shall be via an Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to Ethernet. The Contractor shall supply all necessary expansion boards if contact closure integration will be required.
   2. The access control/video surveillance integration shall be via a native IP interface.
   3. The video surveillance /intrusion detection interface shall be via an Ethernet interface.

B. The Contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.

C. The following minimum features shall be included in the integration; the following list is not all inclusive or exhaustive. The integration shall be a turnkey solution:
   1. Call up live and/or recorded video from an alarm or event.
   2. Graphical maps showing camera icons.
   3. “Mouse over” camera viewing through the DVR/NVR browser and graphical maps.
   4. Playback controls for recorded video.
   5. Camera names brought in from the VMS.
   6. PTZ camera mouse control.
   7. Database entries for intrusion arm/disarm events on individual keypads.
   8. Database entries for intrusion alarm events.
   9. Graphical map symbols for intrusion keypads tied to camera views.
   10. Intrusion devices or zones tied to camera views.
   11. Alarm pop-ups and events shall include instructions and a sequence of operation to deal with events on the Intrusion Detection System, Video Management System and Electronic Access Control System.
   12. Intercom pop-ups when call button is pressed with the ability to unlock the door.
   13. Time syncing via common NTP server.

D. The Contractor shall set up a meeting between the Owner, Consultant and manufacturer to determine the exact functionality of the integration before the integration starts.

3.02 SYSTEM PROGRAMMING

A. The Contractor shall provide all programming necessary for a turnkey system.

B. Programming shall include but not limited to setting all required IP addressing, setting passwords, firmware upgrades, adding the devices into the software, partitioning, area/zone creation, device naming, mapping, cross system integration, etc.

3.03 SYSTEM PARTITIONING, ZONING AND NAMING

A. The Contractor shall program each facility to be in its own partition. Some facilities may require sub-partitions to control user access to certain areas. Each manufacturer may use different names for partitions, zones, areas, etc. Adapt as required.

B. All devices, inputs, outputs and other applicable software/hardware entities shall be named by the Contractor which includes naming at the administration/interface level in additional to the user facing interface.

C. As a basis to start, the following partition, zoning and naming shall be followed:
   1. Partition: Building name
      a. Zone 1: Building name and zone name such as exterior, 1st floor, etc.
         1) Device 1: Building name and floor/zone name - Door # or device name
         2) Device 2: Building name and floor/zone name - Door # or device name
         3) Repeat as required
      b. Zone 2: Building name and zone name such as 2nd floor, etc.
         1) Device 1: Building name and floor/zone name - Door # or device name
         2) Device 2: Building name and floor/zone name - Door # or device name

3) Repeat as required
c. Repeat zones as required.
2. Repeat Partitions as required.

D. The Owner shall have the final say. The Contractor shall schedule a coordination meeting with the Owner and Consultant to coordinate actual project structure and naming prior to starting any programming.

3.04 INSTALLATION PROCEDURES

A. The Contractor shall cable all controlled or monitored doors, intercoms, etc. and terminate this cable in the access control panels no less than 3 weeks prior to substantial completion regardless of the status of the field devices such as door hardware, card readers, intercoms, etc.
B. The Contractor shall program the access control system no less than 2 weeks prior to substantial completion so when field devices are installed and terminated, associated door hardware and full system functionality can be tested. Programming shall include all doors, associated inputs, outputs, and interoperability regardless of final field device status.
C. The Contractor shall perform final connections and testing onsite when field devices such as electrified door hardware has been installed.

3.05 ADA POWER ASSIST DOOR OPERATOR INTERFACE

A. Certain electric locking mechanisms with card access shall be connected (hardwired) to the ADA Power Assist Door Operator pushbutton. In this scenario, card reader shall be interfaced to the ADA Door Operator pushbutton to approve activation of door motor based on card authorization or pre-programmed security schedule.
B. Door motor/operator shall not be energized until authorized by the security system to prevent operation and eventual burn-out of the motor from hitting the button with the security system activated.
C. The door shall allow free egress via push paddle regardless if the door is in a locked or unlocked state.
D. The paddles and operators shall be tied through the access control system, so the actions appear in the device trees, are mappable, logged and can be scheduled or overridden.
E. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.
F. All logic and programming shall be controlled through the access control system. Local logic boards, smart relays, etc. shall not be utilized.

3.06 DOOR RELEASE BUTTONS

A. Door release buttons shall be tied through the inputs of the access control system.
B. The button release shall be interfaced in a way that the actions appear in the device trees, are mappable, logged and can be scheduled or overridden.
C. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.

3.07 REMOTE INTERCOM RELEASE

A. Remote intercom release relays shall be tied through the inputs of the access control system.
B. The intercom release shall be interfaced in a way that the actions appear in the device trees, are mappable, logged and can be scheduled or overridden.
C. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.

3.08 PANIC/DURESS BUTTONS

A. Panic/Duress buttons shall be tied through dedicated inputs of the access control system.

B. The buttons shall be interfaced in a way that the actions appear in the device trees, are mappable and logged.
C. When a panic/duress button is activated an event to action shall occur notifying client workstations. These alarms shall be activated on a map with a clear red flashing icon. Any associated or integrated cameras shall pop-up.
D. Additional actions may be required and shall be coordinated with the Owner and Consultant.
E. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.

3.09 FIRE ALARM INTERFACE

A. Certain electric locking mechanisms shall be connected (hardwired) to the building fire alarm system for fail safe release upon any fire alarm. A single low voltage/low current normally closed dry contact from the fire alarm system shall be provided by others in each room with Security Control Panels. This contact shall open on any fire alarm condition.
B. The access control system shall provide an output to the fire alarm system to release mag hold opens on alarm.
C. The fire alarm system shall provide an output to the access control system to trigger various rules and actions in the access control system.
D. All doors equipped with mag locks shall be connected to a fire alarm relay to release on fire alarm.
E. All doors secured with a card reader in and out shall be connected to a fire alarm relay to release on fire alarm.
F. The Contractor shall provide all additional UL listed failsafe relays and power supplies as necessary to interface to this contact and unlock all of these doors.
G. The Contractor shall verify fail safe and fail secure locking requirements with the Architect, door hardware contractor/provider and the AHJ.

3.10 MAGNETIC DOOR HOLD OPEN INTERFACE

A. Magnetic door hold opens identified to be controlled by the security system shall be interfaced to the access control system via I/O expansion modules.
B. These shall be capable of being controlled by schedule or by override in the event of an emergency.
C. Contractor shall provide all necessary cable, hardware, I/O modules, power supplies, interfaces, and system programming to support all necessary functionality.

3.11 END OF LINE SUPERVISION

A. The Contractor shall furnish and install end-of-line resistors to provide end-of-line supervision on all access control input devices. This shall include but is not limited to door position switches, request to exit devices, door release buttons, and duress/panic buttons.
B. The Contractor shall furnish and install resistors as near to the field device as possible. Supervision resistance values shall be natively compatible with the associated control panel.
    1. Mercury Security based installations shall utilize 1K resistors to provide a 1K / 2K ohm resistance values from associated inputs.

3.12 RS-485 AND OSDP BASED COMMUNICATION

A. RS-485 based communication busses utilized by the access control system shall be compliant with the RS-485 communication standard, including RS-485 end-of-line termination requirements.
B. RS-485 communication busses include control panel and module communication, OSDP based reader communication, and RS-485 based intelligent lock gateways.
C. The Contractor shall furnish and install 120-ohm end of line termination at control panels, modules, readers, and other peripherals where applicable.

D. Termination shall be integral to the hardware where available. The Contractor shall furnish and install a 120-ohm resistor to terminate equipment not featuring on-board RS-485 termination.
E. The Contractor shall furnish and install 1K-ohm pull down/line bias resistors between the DAT/TR- and GND lines on interface modules and controllers. The pull down/line bias resistor shall be installed at the panel for each reader.
F. The Contractor shall configure OSDP devices to communicate at a minimum of 38,400 baud rate. The default 9,600 baud rate is not acceptable.

3.13 PASSWORDS

A. The Contractor shall coordinate a secure project password with the Owner and Consultant. This password shall be documented by the Contractor and used for all devices.

3.14 TESTING

A. Refer to Section 27 0000 for additional requirements.
B. Prior to energizing or testing the system, ensure the following:
    1. All products are installed in a proper and safe manner per the 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. All products are neat, clean, and unmarred, and parts are securely attached.
C. Contractor shall ensure that each device in the security system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

3.15 TRAINING

A. Refer to Section 27 0000 for additional requirements.
B. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.
    1. Contractor shall provide up to 6 hours of scheduled and dedicated training time in three (3) two (2) hour sessions for administration and investigation.
    2. The Contractor shall provide up to 2 hours of dedicated training time for badge creation, printing and printer maintenance.
    3. Provide printed training materials for each trainee, including product manuals, course outline, workbook or student guides, and written examinations for certification.
    4. Provide hands-on training with operational equipment.
    5. Training shall be oriented to the specific system being installed under this contract as designed and specified.
    6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.16 WARRANTY

A. Refer to Section 27 0000 for additional requirements.

3.17 INSTALLATION PRACTICES

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner reserves the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.
B. The Owner reserves the right to halt any installation due to failure of Contractor to observe installation-free periods due to instructional or administrative requirements. To the maximum extent possible, the Owner will provide advance notice of such periods.
C. Contractor is responsible for providing a complete and system.

D. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.
E. Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.
F. Installation of locks on fire rated doors which require any modification or drilling of the door shall be done in accordance with the NFPA by a properly qualified and certified installer. The doors field WH-ETL labelling shall be properly updated.

3.18 COORDINATION

A. Contractor shall provide up to 8 hours (up to four, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with sequence of operation, rule creation and coordination as requested by Owner or Consultant.

3.19 AESTHETICS

A. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.
B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.
C. For any given telecom room, a horizontal and vertical alignment for all mounting hardware will be maintained to provide a symmetrical and uniform appearance to the distribution frame.
D. All surface-mounted devices shall be firmly secured level and plumb
E. All rack mount equipment shall be securely installed.

3.20 HARDWARE LAYOUT

A. Hardware positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.21 SERVER INSTALLATION PRACTICES

A. Verify that the manufacturer approved server hardware, OS meets the Owner’s IT standards prior to ordering.
B. Coordinate server power, cooling, and mounting requirements with Owner prior to installation.
C. Coordinate virus scan/security software requirements with Owner and manufacturer prior to installation.

3.22 DEVICE CABLING/WIRING INSTALLATION PRACTICES

A. All external wire and cables shall be supported in maximum 5 foot intervals from the structure or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables. Provide j-hooks as needed where cable tray or raceway is not available.
B. Contractor shall coordinate installation with Division 27 cabling Contractor to ensure there is at least 2-inches of physical separation between security cabling and voice/data cabling throughout cable path. Voice/data cabling Contractor has first claim to cable tray.
C. All cables, regardless of length, shall be labeled within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified.
D. All cables shall have 6-foot service loops neatly coiled in the equipment room. During initial cable rough-in, Contractor shall have sufficient slack to route anywhere within the equipment room.
E. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the

Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost. Plastic zip ties are not allowed.

F. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.
G. Cables shall not run above red iron joist.
H. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.
I. Ties and straps shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.
J. Contractor shall notify Owner immediately if obstruction or hazard is discovered in a pathway provided by others.
K. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer's rating.
L. No splices shall be installed in any cable.

3.23 CABLE TERMINATION

A. Termination hardware (blocks and patch panels) positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.24 FIRE STOPPING

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for This Contractor to pass cable through, shall be the responsibility of the This Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.
B. Contractor shall be responsible for providing a waterproof seal in and around any openings to the outside environment intended for use by the Contractor

3.25 SYSTEM INSPECTION

A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.
B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

3.26 LABELING

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on Project as-built drawings.

3.27 DOCUMENTATION

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval as described in section 27 60 00. All documentation shall become the property of the Owner.
B. Documentation shall include the additional specific items detailed in the subsections below:
    1. Contractor shall provide hard copy and electronic forms of the final test results.
    2. Contractor shall provide a document including the following:
        a. Door label/identifier
        b. Location of each drop by orientation/permanent landmark in the room
        c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

3.28 PRE-CHECK OUT

A. The Contractor shall demonstrate the following to Owner during system demonstration.

1. The card readers are fully installed and functional.

3.29 FINAL ACCEPTANCE

A. In addition to closeout requirements in section 27 6000, This Contractor shall demonstrate the following before final approval.
   1. Owner training is complete.
   2. Punch list items are complete.
   3. As-built documentation is complete and submitted to Owner/Consultant.

3.30 FINAL PROCEDURES

A. Perform final procedures in accordance with section 27 6000.

END OF SECTION

SECTION 27 6600
INTRUSION DETECTION SYSTEM

PART 1 GENERAL

1.01 SCOPE

A. This specification section covers the complete replacement of the existing campus Intrusion Detection System (ISD). The Contractor shall provide all necessary hardware and labors to provide a fully functional IDS systems and coordinate any additional requirements (i.e. power and data).
B. The Contractor shall furnish and install a new Intrusion Detection System (IDS) throughout the campus, as specified.
    1. Note: The contractor shall schedule time inspect to be familiar with the campus before bidding.
        a. New Areas: Are shown where new hardware shall be placed.
        b. Other Areas: It is the responsibility of this contractor supply similar IDS functionality throughout the remainder of the campus.
        c. No additional changes or adds to the contract shall be allowed due to the unfamiliarity of the campus or based on assumptions.
        d. The existing system shall be demolished including all end devices and cabling and replaced with new cabling and intrusion hardware throughout the entire campus.
    2. Contractor shall furnish, install and program all intrusion detection hardware devices, mounting brackets, power supplies, switches, detectors, controls, consoles cables, and other components of the system as specified.
    3. Contractor shall provide all necessary materials, hardware, software and cabling required to furnish a fully functional system as specified.
    4. Provide all required programming, testing, and commissioning for a complete turn-key system.
    5. Contractor shall confirm system monitoring program requirements with Dallas ISD-IT-CSS, Central Dispatch, and M&O
    6. Furnish and install outlets, junction boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation.
        a. Requirements shall be in accordance with Division 26 0000, Electrical.
        b. Refer to Section 27 0000 for additional project scope information.

1.02 RELATED WORK

A. Section 27 0000 – General Technology Requirements
B. Section 27 0500 – Communications General Requirements
C. Section 27 0523 – Pathways for Technology Systems
D. Section 27 0526 – Grounding and Bonding for Technology Systems
E. Section 27 1100 – Communications Equipment Rooms
F. Section 27 1500 – Communications Horizontal Cabling
G. Section 27 1600 – Communications Connecting Cords
H. Section 27 1800 – Communications Labeling and Identification
I. Section 27 5100 – Distributed Communications Systems
J. Section 27 6000 – Physical Security General Requirements

1.03 DEFINITIONS

A. Refer to Section 27 0000 for additional definitions.

1.04 REFERENCE STANDARDS AND CODES

A. National Electric Code, Article 760.
B. National Fire Alarm Code (NFPA 72).
C. Administrative Council for Terminal Attachments (ACTA):

1. ANSI/TIA-968-A-2002 Technical Requirements for Connection of Terminal Equipment to the Telephone Network.

D. American National Standards Institute (ANSI):
   1. ANSI C63.4 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

E. Federal Communications Commission (FCC):
   1. Title 47 C.F.R. Part 15; Class B – Radiated and Conducted Emissions.
   2. Title 47 C.F.R. Part 68; rules governing the connection of Terminal Equipment (TE) to the Public Switched Telephone Network (PSTN).

F. The National Institute of Standards and Technology of the United States of America (NIST):
   1. Federal Information Processing Standards Publications 197 (FIPS 197) –Advanced Encryption Standard (AES).

G. Underwriters Laboratories, Inc. (UL):
   1. UL 50 - Enclosures for Electrical Equipment.
   2. UL 294 – Access Control System Units.
   3. UL 365 - Police Station Connected Burglar Alarm Units and Systems.
   4. UL 609 - Local Burglar Alarm Units and Systems.
   5. UL 985 - Household Fire Warning System Units.
   6. UL 1023 - Household Burglar Alarm System Units.
   7. UL 1076 – Proprietary Burglar Alarm Units and Systems
   8. UL 1610 - Central Station Burglar-Alarm Units.
   9. UL 60950-1 - Information Technology Equipment - Safety.
   10. UL 636 – Hold up alarms

H. Refer to Section 27 0000 for additional requirements.

1.05 QUALIFICATIONS

A. The Contractor shall be a Napco certified dealer.
B. Refer to Section 27 0000 for additional requirements.

1.06 PRE-CONSTRUCTION SUBMITTALS

A. The Contractor shall submit the intrusion detection hardware layouts which includes the number of controllers, sub-panels and other associated devices per location.
B. The Contractor shall submit full power calculations which includes the anticipated power loads, number and type of power supplies including all power supply boards, number of 120VAC circuits required, battery backup including the quantities of batteries to meet requirements.
C. Refer to Section 27 0000 for additional requirements.

1.07 PRE-INSTALLATION PROCEDURES

A. For in-use, existing facilities or retrofit projects, the Contractor shall assign all applicable electronics IP addresses, passwords and pre-build out all the enclosures including the interconnects within the enclosure prior to being delivered to the project or installed.
B. The Contractor shall cable all monitored doors, detectors, etc. and terminate this cable in the control panels no less than 3 weeks prior to substantial completion regardless of the status of the field devices.
C. The Contractor shall program the intrusion detection system no less than 2 weeks prior to substantial completion so when field devices are installed and terminated, the full system functionality can be tested. Programming shall include all monitored doors, associated inputs, outputs, and interoperability regardless of final field device status.
D. The Contractor shall perform final connections and testing onsite when field devices has been installed.
E. Refer to section 27 0000 for additional requirements.

1.08 CONSTRUCTION PROGRESS SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

1.09 CLOSEOUT SUBMITTALS

A. Refer to Section 27 0000 for additional requirements.

PART 2 PRODUCTS

2.01 ALARM CONTROL PANEL

A. Intrusion detection systems are monitored by an AES-Multinet receiver at Dallas ISD's central monitoring system. Intrusion Detection systems are to report to central monitoring system via an AES 7007 Burglary Subscribers IntelliNet 2.0 or Dallas ISD approved equal.
   1. If central monitoring system is not available, signal is to be sent to Southwest Dispatch or as directed by Dallas ISD designated representative.
   2. Provide twelve months of monitoring service required as part of the install.

B. Manufacturer:
   1. High schools requiring 96-255 zones: NAPCO Gemini X-255 (https://www.napcosecurity.com/products/gemx255/)

2.02 EXPANSION MODULES:

A. Locate module and power supply inside enclosure and install near electrical outlet within telecom rooms/closets throughout the building for ease of installation.
B. All expansion modules to be tied into the main intrusion detection panel.
C. Provide external power supply with each expansion module.

2.03 BATTERIES AND BACKUP

A. The Contractor shall provide a minimum of (1) 12V, 7ah, sealed Absorbent Glass Mat (AGM) style batteries with F style terminals per power supply and (1) per control panel. Provide additional as required based on calculated power load.
B. Provide adequate battery backup as required by Authority Having Jurisdiction (AHJ) or a minimum of 8-hours.
C. Manufacturer:
   1. Interstate Power Patrol FAS1075
   2. Power Sonic PS-1270
   3. Or approved equal

2.04 END OF LINE SUPERVISION

A. All monitored intrusion detection devices shall include EoL monitoring.
B. Provide a dual 1k + 1k end of line (EoL) pre-built resistor pack. GRI (George Risk Industries, Inc.) 6644 series or approved equal.
   1. Adjust resistance values as required by the manufacturer.

2.05 DOOR CONTACTS/DOOR POSITION SWITCHES (DC)

A. The Security Contractor shall be responsible for the connection of all door position devices to the intrusion detection system. Door position devices shall be integral to the door hardware whenever possible. The Contractor shall refer to the door hardware schedule and coordinate with the door hardware Contractor on locations and requirements.
B. Sealed and potted magnetic reed switch in contact housing.
C. Provide DPDT for applications with multiple security systems (Access Control/Intrusion Detection or PLC) utilizing a single door contact.
D. Door contacts shall be appropriately sized for any established holes within door frames.
E. Parts provided are basis of design. Determination of final part number is the responsibility of Contractor.
F. Provide color that matches door as close as possible.

G. Provide recessed switch whenever possible.
H. Armored whip for surface mount contacts.
I. Provide GRI (George Risk Industries, Inc.) 180 Series for recessed applications.
    1. Or approved equal.
J. Provide GRI (George Risk Industries, Inc.) 4400 series for surface mount applications.
    1. Or approved equal.
K. Provide GRI (George Risk Industries, Inc.) MC-180 Series for hollow top channel applications.
    1. Or approved equal.
L. Provide GRI (George Risk Industries, Inc.) 4532 Series for overhead door applications.
    1. Or approved equal.

2.06 MOTION DETECTORS

A. The motion detector shall be a multi-technology, IR and range adaptive radar device.
B. Each detector shall be home run to the nearest expansion module or main intusion panel
    1. Provide power distribution, as required.
C. Reduces false alarms by sensing both heat, physical motion and compensation algorithms.
D. Wide angle: 60’ x 80’ standard coverage, selectable 25’ x 33’ coverage.
E. Long range: 8.5’ x 100’ standard coverage, selectable 3.3’ x 25’ coverage.
F. Active white light suppression
G. Dynamic temperature compensation
H. Draft and insect immunity
I. Sensor data fusion
J. Power requirements: 9-15 VDC
K. Maximum current draw of 26ma at 12VDC.
L. Can be mounted between 7’-10’ with no adjustments.
M. Provide with appropriate mounting hardware, Bosch B328 (wall), B338 (ceiling) or equal.
N. White.
O. Manufacturer:
    1. Wide Angle: Bosch ISC-PDL1-W18G
    2. Narrow Angle, long range: Bosch ISC-PDL1-WC30G
    3. Or approved equal

2.07 360 MOTION DETECTORS

A. The motion detector shall be a multi-technology, IR and range adaptive radar device with anti-mask.
B. Each detector shall be home run to the nearest expansion module or main intrusion panel
    1. Provide power distribution, as required.
C. Reduces false alarms by sensing both heat, physical motion and compensation algorithms.
D. 360 Degree coverage: 52’ diameter.
E. Active white light suppression
F. Dynamic temperature compensation
G. Draft and insect immunity
H. Sensor data fusion
I. Power requirements: 9-15 VDC
J. Maximum current draw of 24ma at 12VDC.
K. Can be mounted between 8’-20’ with no adjustments.
L. Mounts to standard 1-gang 3.5” rectangular electrical box.

M. White.
N. Manufacturer:
    1. 360-degree: Bosch DS9370
    2. Or approved equal

2.08 PANIC AND DURESS BUTTONS

A. Stainless steel cover
B. DPDT contacts for connecting to multiple systems
C. Fully supervised
D. Reset key for testing and resetting alarms
E. Recessed latching button to prevent accidental activation
F. Coordinate exact mounting location with Owner prior to purchase and installation
G. Manufacturer:
    1. Honeywell 269R
    2. Or approved equal

2.09 INTRUSION DETECTION PANEL ENCLOSURES

A. Provide a power supply/chargers and sub-assemblies to power various intrusion controller boards, detectors, audible/visual alarms and other access control or security system components. The Contractor shall select the appropriate enclosure, power supply and sub-assemblies for each application.
B. Enclosures
    1. Shall be capable of accommodating power supplies, sub-assemblies and other manufactures boards when required.
    2. Wall mountable.
    3. Include a cam-lock and tamper switch.
    4. Provide with main backplane and door backplane.
    5. Manufacturer:
        a. Altronix Trove2BH2 with TBHD2 door backplane or as appropriate for intrusion panel manufacturer.
C. Sub-Assemblies
    1. The Contractor shall provide all sub-assemblies to meet the project requirements.
    2. Access Control Module
        a. Independently controlled fused protected outputs:
            1) Fail-Safe and/or Fail-Secure power outputs.
            2) Dry form “C” 5 amp rated relay outputs (fused).
            3) Any combination of the above
    3. Access Control System trigger inputs:
        a. Normally open (NO) inputs.
        b. Open collector sink inputs.
        c. Any combination of the above.
    4. Multi-Output Power Distribution Module
        a. Single input distributed over eight (8) or sixteen (16) outputs.
        b. Fused protected outputs.
        c. Output terminals shall accommodate up to 12AWG wires.
    5. Multi-Output Power Distribution Module with Dual Inputs
        a. Two (2) inputs distributed over eight (8) outputs.
        b. Outputs shall be configurable by input.
        c. Fused protected outputs.
        d. Output terminals shall accommodate up to 12AWG wires.
    6. Power supplies and sub-assemblies shall be manufactured by Altronix or approved equal:
        a. Altronix ACMS8 – Dual input, eight (8) output, fused Access Control Module (UL listed Sub-assembly).

b. Altronix PDS8 - Dual input, eight (8) output, fused power distribution module (UL listed Sub-assembly).
c. Altronix PD16W – Selectable dual input, sixteen (16) output, fused power distribution module (UL listed Sub-assembly).

2.10 ROOF BEAM DETECTION

A. Locations: On roofs with HVAC equipment.
   1. Consider aesthetics and potential vandalism.
B. Penetration of roof membrane or flashing by devices, mounting, or conduits is not allowed.
C. Confirm the extent of each campus roof beam detection system with Dallas ISD-M&O.
   1. Roof beam detection is typically limited to the first roof level.
   2. Possible Exceptions: Where there is ladder access to/from another level or other campus specific concern.

2.11 POWER TRANSFORMER

A. The Contractor shall provide all required transformers and power supplies.
B. The power supplies shall be hardwired. Pluggable “wall wart” transformers are forbidden.
C. Provide with enclosure as required.
D. 115 VAC input.
E. Provides both a 16 VAC output and 18 VAC output @ 18.7A/16.7A to power both the control panel and power supply panel.
F. Manufacturer:
   1. Altronix
      a. T1618300K
         1) Mount within Altronix Trove 2 enclosure on main backplane in the upper left corner.
   2. Or approved equal

2.12 CABLES

A. Door Contacts, Panic/Duress Buttons: 22-gauge, two-conductor, unshielded, stranded cable shall be provided for all door contacts. The cable shall be white in color and plenum rated.
B. Motion Detectors: 22-gauge, four-conductor, shielded, stranded cable shall be provided for all motion detectors. The cable shall be white in color and plenum rated. Provide 18-guage where distances and voltage drop require it.
C. Keypads/Bus: 18-guage, four-conductor, non-shielded, non-twisted, stranded cable shall be provided for keypads. The cable shall be white in color and plenum rated. Keypad cabling shall not exceed 390 feet. Cable impedance shall not exceed 100 ohms.

PART 3 EXECUTION

3.01 PHYSICAL SECURITY INTEGRATION

A. The intrusion detection system shall be integrated with the electronic access control system.
   1. The access control/intrusion detection interface shall be via an Ethernet interface. Contact closure integration is not acceptable.
B. The Contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreements.
C. Refer to the Electronic Access Control specifications for additional specific integration requirements.

D. The Intrusion system shall be time syncing to a common NTP server across all security systems.
E. The Intrusion system shall synchronize users enrolled or removed through the access control system.
F. The Intrusion system shall disarm on first in authorized and valid card read. Authorized means the user has the appropriate permissions to disarm the intrusion system.
G. The Contractor shall set up a meeting between the Owner, Consultant and manufacturer to determine the exact functionality of the integration before the integration starts.

3.02 SYSTEM PROGRAMMING

A. The Contractor shall set the Ethernet communications to TCP/IP.
B. The Contractor shall enable 128-bit AES encryption when required.
C. The Contractor shall program all inputs EoL resistance values. All inputs shall have an EoL unless specifically submitted on and approved by the Consultant.
D. The Contractor shall configure mail server SMTP settings and port. The Contractor shall coordinate with the Owner on email accounts to be added.
E. Programming system configuration parameters (hardware and software, zone/circuit numbers, communication parameters).
F. Programming operational parameters such as opening/closing reports and windows, system response text displays of events, activation of relays that drive auxiliary devices, and identifying types of zones/loops.
G. Programming passcodes according to the authorities and functions defined by the Owner.
H. The Contractor shall program all compliance and panel wide parameters including onboard and add-on module ethernet parameters, Cloud Remote Connect settings, report routing, power supervision, RPS parameters, miscellaneous settings, etc.
I. The Contractor shall set all point, point profiles, area and debounce times according to the requirements, best practices and Owner requirements. The Contractor shall create custom point profiles as required for desired functionality.
J. The Contractor shall set all Area necessary parameters including force arm/bypass, exit delay time, restart time, area type, part on, exit/entry delay warning, area re-arm time, etc.
K. The Contractor shall assist with entering users, authority levels and PINs.
L. Other system programming tasks required by the owner. These additional programming requirements shall be coordinated between the owner and the contractor.
M. Operational Testing: The contractor shall perform thorough operational testing, walk testing, and verify that all system components are fully operational.
N. Hard-copy System Printout: The contractor shall submit a hard-copy system printout of all components tested and certify 100 percent operation indicating all devices/panels/units have passed the test criteria set forth by the manufacturer.
O. Acceptance Test Plan Form: An acceptance test plan form shall be prepared/provided by the contractor prior to the acceptance walk-through.
P. This form shall include separate sections for each device/panel/unit as well as a column indicating the manufacturer's performance allowance/margin, a column indicating the result of the testing performed by the contractor (pass/fail), and an empty column for recording findings during the walk-through.

3.03 SYSTEM PARTITIONING, ZONING AND NAMING

A. The Contractor shall program each facility to be in its own partition. Some facilities may require sub-partitions to allow arming and disarming of specific areas. Each manufacturer may use different names for partitions, zones, areas, etc. Adapt as required.
B. All devices, inputs, outputs and other applicable software/hardware entities shall be named by the Contractor.
C. As a basis to start, the following partition, zoning and naming shall be followed:

1. Partition: Building name
    a. Zone 1: Building name and zone name such as 1st floor, gym, auditorium, etc.
        1) Device 1: Building name and floor number – detector or device name
        2) Device 2: Building name and floor - detector or device name
        3) Repeat as required
    b. Zone 2: Building name and zone name such as 2nd floor, etc.
        1) Device 1: Building name and floor - detector or device name
        2) Device 2: Building name and floor - detector or device name
        3) Repeat as required
    c. Repeat zones as required.
2. Repeat Partitions as required.

D. Device Naming
    1. All devices shall be named based on Owner direction.

E. The Owner shall have the final say. The Contractor shall schedule a coordination meeting with the Owner and Consultant to coordinate actual project structure and naming prior to starting any programming.

3.04 MONITORING SERVICE AND COMMUNICATIONS INTEGRATION

A. The Contractor shall program the intrusion panels to communicate to the Owner's preferred monitoring service which may be their own internal monitoring or an external service.
B. The Contractor shall program all applicable route groups for primary and backup using the appropriate communication formats accepted by the monitoring service. Set AES encryption where required.

3.05 MOTION DETECTOR INSTALLATION REQUIREMENTS

A. Point away from outside traffic. Position 360 detectors farther from walls. Microwave energy passes through non-metallic walls.
B. Point or position away from direct and indirect sunlight.
C. Point or position away from glass or other objects that rapidly change temperatures.
D. Point or position away from moving or rotating objects such as fans.
E. Mount the detector on a solid and vibration free surface.
F. Avoid mounting the detector within 1 ft (minimum) of any fluorescent light fixtures.
G. Long range, narrow angle detectors should be mounted in the center of hallways when possible.
H. Wide angle detectors should be mounted in corners of the areas being covered when possible.
I. Wide angle detectors mounted in spaces smaller than 25' x 33' should have the DIP switch set to reduce the coverage from the maximum.
J. Long range, narrow angle detectors mounted in corridors shorten than 3.3' x 25' should have the DIP switch set to reduce the coverage from the maximum.
K. Detectors should have the down lens enabled unless specifically noted otherwise.

3.06 END OF LINE SUPERVISION

A. The Contractor shall furnish and install end-of-line resistors to provide end-of-line supervision on all intrusion input devices. This shall include but is not limited to door position switches, motion detectors, glass break detectors, duress/panic buttons and all other inputs being monitored.
B. The Contractor shall furnish and install resistors as near to the field device as possible. Supervision resistance values shall be natively compatible with the associated control panel.

3.07 WIRELESS SURVEY

A. The Contractor shall perform a wireless survey prior to the purchase, rough-in, cabling or installation of the wireless devices.

B. The wireless survey shall be used to determine the optimal device placement which shall be documented and sent to the Consultant for review.

3.08 PASSWORDS

A. The Contractor shall coordinate a secure project password with the Owner and Consultant. This password shall be documented by the Contractor and used for all devices.

3.09 SYSTEM GROUNDING

A. The Contractor shall ground all components of the system to the telecommunications grounding system and ground fault detection shall be enabled according to UL requirements.

3.10 WARRANTY

A. Refer to Section 27 0000 for additional requirements.
B. Contractor shall guarantee all materials, equipment, etc., for one (1) year from date of substantial completion of work. This guarantee shall include labor, material, and travel time.
C. All Intrusion Alarm systems, materials, and labor shall be under warranty for 1 year from date of final acceptance.

3.11 GENERAL

A. Prerequisites
   1. The Contractor shall maintain a competent (single point of contact) project supervisor, along with competent technical personnel acceptable to the Owner and Consultant, during the entire installation process. Best efforts shall be made to avoid change of the project supervision during the project without prior written approval from the Owner and/or Consultant.
   2. The Contractor installing any equipment/devices shall be responsible for providing all interconnecting cables to and/or between same equipment that may be required to make equipment fully operational.

B. Requirements and Responsibilities
   1. The Contractor shall provide, furnish, deliver, transport, erect, install, configure, and connect completely all of the material and equipment described herein or depicted on project drawings. The Contractor shall supply all other incidental material required, such as interconnecting cables, to make the work complete, and to install all systems in a turnkey operating condition.
   2. Perform this work in accordance with acknowledged industry and professional standards and practices, existing build conditions, and as specified herein. Provide and install all materials, devices, components, and equipment for complete, operational systems.
   3. Coordinate all efforts and verify field conditions with those of related trades. In the event of any conflicts, delays or improper preparatory work by others, notify the Owner or Owner’s Consultant: The Owner and Owner’s Consultant’s decision will be binding.

3.12 INSTALLATION PRACTICES

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner and Owner’s Consultant reserve the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.
B. The Contractor shall exercise care during installation - damage to cables or equipment will not be accepted. The Contractor shall remove any damaged cabling or equipment and replace with new.
C. Contractor is responsible for providing a complete and functional intrusion alarm system.

D. Contractor shall provide low voltage power and control lines to and from power supplies, remotely controlled equipment, and other devices, even though not explicitly indicated on drawings or listed in equipment tables.
E. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.
F. The Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.
G. The Contractor shall provide rack shelves or rack mounting ears for any equipment that is not rack mountable. All equipment installed using shelves shall be fastened to the rack shelf.
H. Install plates as required on back boxes where they exist. Provide cut-in back boxes where boxes do not exist.
I. Install surface mounted cable raceway systems that match the surface color and/or the other surface mounted raceways, where cables cannot run within fishable walls.
J. The Contractor installing any RF devices shall be aware that RF devices may cause interference to equipment and shall take whatever precautions necessary to avoid causing interference.
K. The Owner will provide programming information needed to help Contractor with configuration of system. The Contractor shall have the responsibility to program the system, assure proper communications between controlling points and any monitoring companies, and to adjust any system or device causing false alarm conditions.
L. Consideration shall be given not only to operation efficiency, but also to overall aesthetic factors.

3.13 COORDINATION

A. Contractor shall provide up to 4 hours (up to two, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with sequence of operation, zone coordination, rule creation and coordination as requested by Owner or Consultant.

3.14 TRAINING

A. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.
    1. Contractor shall provide up to 4 hours of scheduled and dedicated training time in two (2) two (2) hour sessions for system use and maintenance.
    2. Contractor shall provide up to 1 hours of scheduled and dedicated training time in two (2) thirty (30) minutes sessions for system arming and disarming per site.
    3. Provide printed training materials for each trainee, including product manuals, course outline, workbook or student guides, and written examinations for certification.
    4. Provide hands-on training with operational equipment.
    5. Training shall be oriented to the specific system being installed under this contract as designed and specified.
    6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.15 SUPPORT

A. The Contractor shall make available technical resources, as deemed necessary by the Owner, for database integration projects.

3.16 AESTHETICS

A. All cables terminating at the panel frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.
B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.

C. A horizontal and vertical alignment for all mounting hardware shall be maintained to provide a symmetrical and uniform appearance to the distribution frame.
D. All surface-mounted devices shall be firmly secured and level.

3.17 HARDWARE LAYOUT

A. Hardware positioning and layout shall be according to project drawings.

3.18 DEVICE CABLING/WIRING INSTALLATION PRACTICES

A. Contractor shall coordinate with the Electrical Contractor their requirements for conduits and proper AC power to service all equipment installed by Contractor, in locations where power is not available.
B. Contractor shall provide for proper ground system to all equipment.
C. Each cable group that can cause interference to another group shall be separated by sufficient distance so as not to cause signal contamination or interference.
D. All external wire and cables shall be supported in maximum five foot intervals from the structure, or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables.
E. All cables, regardless of length, shall be marked with indelible color-coded labels within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified. Labels shall be directly hot stamped or factory stamped, closed sleeve method. Adhesive strip labels may only be used if protected by transparent heat-shrink tubing. There shall be no unmarked cables at any place in any part of any system. Marking codes used on cables shall correspond and be shown clearly on as-built drawings.
F. Each cable shall be marked at all cable ends with a standard nomenclature (Device, #, closet letter).
G. All cables shall be separated into like groups, according to signal or power levels, and routed separately to eliminate signal contamination and crosstalk - this includes both inside and outside of equipment racks.
H. All cables shall have 6-foot service loops neatly coiled in accessible ceiling. During initial cable rough-in, the Contractor shall have sufficient slack to route anywhere within Telecommunications Room. Coordinate exact panel and power supply mounting locations with Electrical Contractor.
I. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Velcro straps shall be installed snugly without deforming cable insulation. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost.
J. Cable Ties shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.
K. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.
L. Cables shall not run above red iron joist.
M. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.
N. Contractor shall notify Owner or Owner’s Consultant immediately if obstruction or hazard is discovered in a pathway provided by others.
O. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer’s rating.
P. No splices shall be installed in any cable.
Q. No security device cabling shall have an accessible disconnect outside of a secured equipment room or within a backbox.

R. Any exposed exterior cable shall be contained in waterproof conduit with the appropriate waterproof fittings.
S. All cables are to run at right angles to the structure, placed above the ceiling in halls and corridors.
T. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors and ceilings, assuming any applicable codes and good engineering practice allows and suggests.
U. All cabling systems installed in public areas shall be installed within walls, ceiling or floors or within surface wiring pathways as dictated by codes and good engineering practices.
V. Contractor shall notify Owner or Owner's Consultant immediately if obstruction or hazard to cable paths are discovered and seek corrective actions
W. The cables shall be supported by properly insulated wire support hangers, bridal rings, "D" rings, ladder cable tray, or inner duct as may be necessary to support cables.
X. Contractor shall seal any cable penetrations they may use or make where the penetration is part of a firewall or acoustic barrier.

3.19 EQUIPMENT CABINET WIRE AND CABLE INSTALLATION

A. All power cables, control cables, and high level cables shall be grouped to one side of the equipment rack while low level cables grouped to the other side.
B. All equipment rack wiring and cabling shall be neatly laced, and ends dressed with heat shrink tubing, and all cables shall have service loops between the horizontal tie bar and the connection to equipment. Rack cabling shall be adequately supported with tie wraps or Velcro wire wraps, and horizontal support bars to rack frame as it enters or exits the front or back of equipment.
C. All equipment rack wiring and cabling shall be neatly dressed.
D. Rack cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame.

3.20 CONNECTORS/CONNECTIONS

A. Moisture Resistance: All connectors shall be crimped or applied in such a way as to prevent moisture from entering the connector or cable.
B. Preparation: Cables shall be carefully prepared and connectors installed as directed by the manufacturer. Proper stripping devices and crimping tools shall be used.
C. Terminations: Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner, suited to the service of the wire, and as directed by the manufacturer. In all cases, where the manufacturer specifies the terminations, those terminations shall be used.
D. Termination Testing: The strength of the termination shall be tested by manually pulling on the connector and cable. Any terminations that exhibit movement, loose cable, or insecure connections shall be re-terminated.

3.21 SPECIAL TECHNIQUES

A. Waterproofing: Contractor shall be responsible for providing a waterproof seal in and around any openings to the outside environment intended for use by the Contractor.

3.22 FIRE STOPPING

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for the Contractor to pass cable through, shall be the responsibility of the Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.
B. Any openings created by, or for Contractor, and left unused, shall be sealed up as part of this work by the Contractor.

3.23 TEST REQUIREMENTS FOR DEVICE CABLING

A. Contractor shall perform continuity tests to ensure cables are free of shorts within the pairs, and shall verify cables for continuity, pair validity and polarity, and conductor position.

3.24 SYSTEM TESTING PROCEDURES

A. Prior to energizing or testing the system, ensure the following:
   1. All products are installed in a proper and safe manner per the 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. All products are neat, clean, and unmarred, and parts are securely attached.

B. Contractor shall ensure that each device in the security system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

3.25 SYSTEM INSPECTION

A. Contractor shall coordinate with Consultant for inspection after Contractor has completed testing of entire system.
B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.
C. Contractor shall demonstrate to Consultant the functionality of the system, including the selection of various display modes and accessing system functions.
D. Contractor shall verify with Consultant the precise positioning of all devices and shall make fine adjustments as requested.

3.26 LABELING

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on project as-built drawings.
B. Contractor shall label both ends of the cable within four (4) inches of the termination with the same label identifier. These will be machine printed, Brady (or equivalent) labels.
C. Panels shall have labels showing cable numbers and far end locations for each cable terminated in the cabinet.

3.27 DOCUMENTATION

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval. All documentation shall become the property of the Owner.
B. Documentation shall include the items detailed in the subsections below:
   1. Contractor shall provide hard copy and electronic forms of the final test results.
   2. Contractor shall provide a document including the following:
      a. Device label/identifier
      b. Location of each device by room or corridor number
C. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.
D. Consultant will provide floor plans in paper and electronic formats (".dwg," AutoCAD and ".dxf") on which as-built construction information can be added. The Contractor shall modify these documents accordingly to denote as-built information as defined above and then return the documents to the Owner.

3.28 FINAL ACCEPTANCE

A. The Contractor shall demonstrate the following before final approval.
   1. Owner training is complete.
   2. Punch list items are complete.
   3. As-built documentation is complete and submitted to Owner/Consultant.

3.29 CLOSEOUT PROCEDURES

A. Closeout Submittals: Contractor shall provide closeout documentation to the Consultant. The Consultant shall receive the closeout submittals no less than 72 hours prior to the scheduled inspection time.
B. Inspection: Contractor shall be present for the inspection by the Consultant. Contractor shall supply all testing equipment needed to verify compliance with the specifications.
C. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet written system specifications, and/or unacceptable to the Consultant, shall be documented by the Consultant and provided to Contractor to rectify.
D. Re-Inspection: If a re-inspection is necessary, the costs of the Consultant's additional travel, hours, and expenses may be deducted by the Owner from the contract amount due Contractor.
E. Punch List Approval: The punch list shall be considered complete only after having been signed by the Owner and Consultant.

3.30 CLEANING

A. Prior to system final turnover to Owner:
    1. Remove all dirt and debris from equipment racks and equipment rooms.
    2. Clean all equipment filters, vents, and fans.
    3. Clean all enclosures and back box interiors thoroughly before installing plates, panels, or covers.

END OF SECTION

SECTION 28 0500

COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Every item of labor, material, devices and appurtenances for installing a complete Electronic Safety and Security System and other related systems included in Division 28 of the Specifications.
   1. Section 28 05 26 – Grounding And Bonding For Electronic Safety And Security Systems
   2. Section 28 05 28 – Pathways for Electronic Safety and Security
   3. Section 28 05 53 – Identification for Electronic Safety And Security
   4. Section 28 10 00 – Electronic Access Control and Intrusion Detection
   5. Section 28 20 00 – Electronic Surveillance
   6. Section 28 31 00 - Fire Detection And Alarm

1.03 RELATED WORK:

A. General: See all other portions of these Contract Documents and apply to those portions of work, relating to the following Electronic Safety and Security Systems: Electronic Access Control and Intrusion Detection, Fire Detection and Alarm, Electronic Surveillance, the same as if repeated herein in its entirety. The Division 28 Trades shall provide and install all wiring, all equipment, all electronics, all software and accessories as specified and shown on the drawings and as needed to provide complete and operational systems. Division 28 Trades shall provide to Division 26 special boxes, cabinets, racks, hangers, and etc. for installation.

B. Division 21 – Fire Suppression

C. Division 23 - Mechanical

D. Division 26 – Electrical

E. Division 27 - Communications

1.04 WORK NOT INCLUDED:

A. Provide roughing-in, including the empty boxes, conduit, pull strings, etc. under Division 26 for the following related Sections:
   1. Section 28 05 26 – Grounding And Bonding For Electronic Safety And Security Systems
   2. Section 28 10 00 – Electronic Access Control and Intrusion Detection
   3. Section 28 20 00 – Electronic Surveillance
   4. Section 28 31 00- Fire Detection And Alarm

1.05 DRAWINGS:

A. Where conduit, equipment, devices and other electrical appurtenances are shown on the drawings, the general arrangement of such items on the electrical drawings shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the electrical drawings, it is not feasible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.

1.06 QUALITY ASSURANCE:

A. Equipment and material used in the project shall be new and undamaged. The installation shall fit into the space allotted and shall allow adequate, acceptable, clearances for entry, servicing, safety,

and maintenance. The Contractors shall coordinate the work to ensure that the equipment may be moved into place without altering building components or other installations. All electronic safety and security systems (above) work shall be performed by a a licensed Texas Electrical Contractor(s) whose technicians, mechanics, or tradesmen shall be skilled and certified in the trade involved. All Division 28 work shall be performed under the direct supervision of the equipment systems' authorized technician with a locally recognized and accepted master electrician's license. All work under Division 28 shall be provided by a single-source Division 28 vendor/subcontractor approved by the Owner to be utilized for this work.

B. Equipment and material in existing installations may be reused where specifically indicated on the drawings.

1.07 REFERENCES:

A. The complete installation and all materials and equipment under Division 28 shall conform to the current International Building Code including all applicable portions of the National Electrical Code (NEC) and all other governing codes, regulations and certifications. All wiring methods shall adhere to Division 28 specified wiring methods.

B. All equipment used shall bear the Underwriters Laboratory (U.L.) label for the intended application, or other organizations label if acceptable to the Authority having jurisdiction and concern with product evaluation.

C. In addition, the following codes, standards, and regulations shall apply to the complete installation and all materials and equipment. These are referred to by their accompanying abbreviations.

1.	National Electrical Code (NFPA No. 70) 2023	NEC
2.	National Electrical Manufacturers Association	NEMA
3.	Underwriters Laboratories, Inc.	UL
4.	Telecommunications Building Wiring Standards	TIA/EIA
5.	All Systems' Installation Certification Compliance Documents for Installing Trades	
6.	National Fire Protection Association	NFPA
7.	Uniform Federal Accessibility Standards	UFAS
8.	Americans with Disabilities Act Accessibility Guideline	ADAAG

D. The above standards are intended as a minimum and shall be exceeded if required by the Contract Documents. In the event information contained in the Contract Documents conflicts with one of the above mentioned codes, the codes shall take precedence.

1.08 PERMITS, LICENSES, TAXES AND INSPECTION CERTIFICATES:

A. All permits, bonds, licenses, inspection fees and taxes required for the execution of the work shall be obtained and paid for by the Contractor. Under each phase of the Division 28 work, the Contractor shall furnish three copies of certificates of final acceptance to the Engineer from any inspection authority having jurisdiction.

B. At the completion of the job, provide the Engineer with three (3) copies of the fire alarm inspection certificate from the Authority having jurisdiction, if such inspection is provided and/or required by the locality.

OR

A. All bonds, licenses, and connection fees, inspection fees, and taxes required for the execution of the work shall be obtained and paid for by the Contractor. The contractor is advised that since this project is on State property, Building Codes and Zoning Ordinances of local political sub-divisions do not legally apply. Building permits required by the locality consistent with the Governors memorandum of September 11, 1973, will be obtained and paid by the Owner.

1.09 REGULATIONS AND STANDARDS:

A. The completed installation and all materials and equipment shall conform to local ordinances and codes, other regulations and standards listed herein or in related sections. These are intended as a

minimum and shall be exceeded if required by the specifications or the Drawings. In the event of conflict between the codes, standards, or regulations, and information contained in the Contract Documents, the applicable code, standards, or regulation shall take precedence.

1.10 SUBMITTALS:

A. Submit shop drawings, product data and samples in accordance with Division 1 for all items as specified in related sections of these specifications. One (1) electronic (PDF) copy of the submittal shall be submitted. One (1) electronic (PDF) copy of the submittal will be returned to the Contractor. If additional copies are required, they will be the responsibility of the Contractor. Where drawings are submitted, the Contractor shall submit a minimum of two (2) sets of full scale prints. One (1) copy will be marked and returned to the Contractor, and the Contractor shall be responsible for all additional copies required for his use. All submittal data shall be correctly identified to show project name, and the exact model, style or size of item being submitted. Improperly identified submittals will not be reviewed by the Engineer. Each item submitted for review shall bear the Subcontractor's stamp which states that they have reviewed the submission, that it is complete, and that in their opinion it meets the contract requirements. Contractor's stamp shall identify the paragraph and page number for which the submittal is being made. Any submission which has not been reviewed and stamped by the Electrical Trade will not be reviewed by the Engineer. No reviews prior to award of Contract will be considered or accepted.

B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these Contract Documents shall be submitted as follows:
   1. All the equipment and materials where submissions are specifically required by other Divisions of these Contract Documents.
   2. All the equipment and materials that are indicated with a [S] behind the product title. This shall include submission of the specified products equipment and materials.
   3. All the equipment and materials that are acceptable equal substitution.
   4. If submission is NOT required for the SPECIFIED products "shop drawings and product data" under 1. and 2. above, the Contractor shall NOT submit the SPECIFIED products "shop drawings and product data".
   5. Samples, in good working order, shall be submitted in accordance with Division 1, complete with all installation and service drawings and instructions. All samples will be returned at the submitter’s expense unless otherwise indicated. Samples may be subject to destructive testing by Engineer.

C. Operation and Maintenance manuals shall be submitted in accordance with Division 1 and shall include a copy of all accepted shop drawings, installation and maintenance data, operation instructions, parts lists, and the name, address and telephone number of supplier or nearest representative. All electrical and electronic devices, equipment and systems marked [O/M] in these specifications shall be included and all other such electrical and electronic items which will require servicing before the duration of its useful life has been reached. Manuals shall be presented to the Engineer for review and transmitted to the Owner before the final payment is recommended.

D. Equivalents:
   1. Not all of the Manufacturers, trade names and/or model numbers are indicated herein, or on the drawings.
   2. Unless definitely stated otherwise and upon complying with Division 1, the Contractor may use any article of equal appearance, which in their judgment is equal to the article that is specified and is accepted by the Engineer.
   3. Where three (3) or more manufacturers are named in the specifications for any item, the Contractor shall use one of the three (3) listed manufacturers. **No other manufacturers shall be reviewed or accepted.** Manufacturers that are listed first in these specifications and on drawings were used as a basis of design.
   4. It will be the responsibility of the Contractor to verify all connections, physical sizes and capacities of all other manufacturer's items, both named or proposed. If the equipment necessitates changes in power distribution, conduit, wiring, lighting, wiring, or any other building systems from that indicated on the drawings, the Contractor shall be responsible for

all additional costs included and notify other trades of the changes. Where such changes are required, detail drawings indicating all required changes shall be submitted for review at the same time the manufacturers drawings are submitted for approval.

5. Refer to Division 1 for substitutions.

E. The ten day prior approval requirements of The Instructions to Bidders, AIA 701, are waived for this Division of the Specifications, and unless stated otherwise, the Contractor may use items that he deems as equivalent in quality and performance to the specified item subject to final acceptance of substituted items by the Engineer upon his review of shop drawings. (**This paragraph cannot be used with BCOM jobs.)**

F. Guarantee: Electronic safety and security systems equipment, materials and labor required by these specifications and accompanying drawings shall be guaranteed to be free from defective materials or workmanship for a period of one year after final acceptance of the project except extended warranties as specified elsewhere in these documents on specific items of equipment will be furnished by the Trade providing the equipment. Defects in material or workmanship occurring during this period shall be corrected with new material and equipment or additional labor at no cost to the Owner. Manufacturer's certificates of warranty shall be transmitted to the Owner before final payment is recommended.

1.11 WARRANTIES:

A. The Contractor shall warrant for a period of one year all work provided under the Contract to include, but not necessarily limited to, all systems, equipment, materials, and workmanship. This shall not be construed to limit any extended warranty periods of longer than one year for specific items or systems specified elsewhere in the Contract Documents.

B. The warranty period shall commence on the date of acceptance by the Owner and shall cover all parts and labor as required to fulfill the warranty at no cost to the Owner.

C. Refer to Division 1 for additional warranty requirements.

D. Information on all warranties shall be included in the O&M manuals specified herein to be provided to the Owner.

1.12 COORDINATION OF WORK:

A. General: The contract documents indicate the extent and general arrangement of the electronic safety and security systems. The Contractor shall be responsible for the coordination and proper relation of the electronic safety and security system work to the building structure and to the work of other trades. No additional compensation or extension of completion time will be granted for extra work caused by the lack of coordination.

B. Cooperation: The Contractor shall provide dimensions and locations of all openings, shafts and similar items to the proper trades and install work as required so as not to interfere with, or delay, installation of systems under construction in the buildings.

C. Locations of lines and equipment shall be determined from actual field measurements. The outlines of the building shown on the electrical drawings are intended only as a guide to indicate relative locations of the electronic safety and security work. Refer to the existing buildings and structural components to determine actual measurements. If conflicts prevent installation of electronic safety and security work at the locations indicated, minor deviations shall be made subject to acceptance by the Engineer, and without additional compensation.

D. Cutting and Patching: See Division 1 and Division 26.

E. Roughing-In: Equipment, racks, cabinets, manual pull stations, smoke detectors, devices, and other similar items shall align vertically or horizontally with each other, the building structure and features thereof when it appears obvious and logical that they should. All mounting heights shall be within the limits of IBC and ADAAG.

F. Damage to Other Work: The Division 28 Trades are responsible for damage to other work caused by his work or workmen. Repairing of damaged work shall be done by the Trade who installed the work, and as directed by the Engineer; the cost of which shall be paid for by the Division 28 Trades.

1.13 ASBESTOS:

A. Asbestos Free Materials: The intention of these drawings and specifications is that there be no asbestos containing materials installed on this project. To the best of the Engineers' knowledge, none of the material or equipment specified herein or shown on the drawings contain asbestos. The Contractor shall make every effort to prevent any asbestos materials from being installed in or used on the construction of the project. At the completion of the project, the Contractor shall certify by letter that to the best of his knowledge, no asbestos containing materials were used for or in the construction of this project.

B. Existing Materials:

1. Discovery: If during the construction of this project, work involving friable asbestos is suspected or encountered, all work in this area shall be discontinued and the Owner or the Owner's representative, shall be notified immediately and the Owner with his own forces or by separate contract shall be responsible for complete investigation, removal, and disposition of the friable asbestos hazard in accordance with applicable laws and regulations. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the contract documents.
2. Removal: All work involving the removal of friable asbestos will be done under a separate contract.

1.14 GRAPHICS DATABASE:

A. This project's Computer Aided Design & Drafting (CADD) drawing files may be purchased directly from the Engineer for use in preparing computer graphics specific to the project. See Appendix A at the end of this Section for Letter of Indemnification and ordering instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND MATERIALS:

A. General: Manufacturers and materials shall be as specified in subsequent sections of these specifications and as noted on the drawings. Similar types of equipment shall be the products of the same manufacturer unless specified otherwise.

2.02 SLEEVES AND INSERTS:

A. General: Sleeves and inserts shall be provided and correctly located in the structure, as required for the work.

B. Inserts shall be steel and of proper size for loads encountered.

2.03 ACCESS DOORS:

A. Provide for all junction boxes or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for work shall be furnished as a part of this Division to the General Contractor for installation. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable. Doors shall be metal access doors with cam lock, style to match ceiling or wall construction. Doors occurring in rated construction shall be fire rated U.L. labeled access doors correlated to preserve the integrity of the rated construction. Doors shall be prime finish steel except those in toilets, shower rooms, locker rooms, kitchens and other similar areas shall be aluminum with natural anodized finish. Doors shall match the access doors in Division 23 and meet the acceptance of the Architect.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. General: Materials and equipment shall be installed in accordance with manufacturer's instructions to conform with the details and application as specified in subsequent sections of these specifications and indicated on the drawings.

B. Supports: Provide necessary supports for all equipment and appurtenances as required; this includes, but is not limited to, frames or supports for items such as cabinets, junction boxes, conduit, outlet boxes, and other similar items requiring supports. Foundation drawings, bolt setting information and foundation bolts shall be furnished by the subcontractors furnishing the equipment for all equipment required to be bolted to the floor, wall or above ceiling structure.

C. Sleeves: Provided by Division 26.

D. Temporary Requirements: Openings in equipment shall be kept capped at all times until connection is made to the system. The ends of all conduits and equipment openings shall be kept capped properly with approved devices. Approved devices are items such as specially molded plastic caps and sheet metal caps.

E. Access Doors: Provide access doors for all concealed electric equipment, pull boxes, junction boxes or any item requiring access. Doors shall be of sufficient size and so located that the concealed items may be serviced or completely removed and replaced. Doors required for Division 28 work shall be furnished by Electrical Trade to the Contractor for installation. Doors in acoustic tile ceilings shall be furnished in multiples of tile sizes. Doors are not required in exposed grid type ceilings where tiles are removable.

F. Painting: All work under this Division shall be painted in accordance with Section 28 05 53, Identification for Electronic Safety and Security Systems.

3.02 EXISTING WORK AND DEMOLITION:

A. Demolition: Remove all existing wiring, junction boxes, outlets, devices, cabinets, etc., indicated for demolition. Additional amounts of demolition may be required to accommodate desired renovations and new construction. Not all demolition may be shown on the drawings. All existing electronic safety and security systems equipment not indicated for demolition shall remain in place.

B. Equipment Removed: The Owner will select and retain such existing electronic safety and security systems equipment and materials which are indicated to be removed and not reused, as he desires. All other existing equipment and materials indicated to be removed, and not reused shall become the property of the Contractor, who shall remove them from the premises within the time frame specified under other Divisions of this Contract Document.

C. Equipment Relocated: All existing equipment and materials indicated to be relocated shall be disconnected, removed, and relocated. All equipment and materials shall be protected from damage during demolition.

D. Service Interruption: Attention is called to the fact that the existing facility shall remain in operation throughout the construction period. All necessary temporary arrangements shall be made as required to keep all security, alarm, control, etc., circuits in continuous operation during this period except for scheduled outages for change-overs. The outage shall be kept to the minimum and carefully scheduled to suit the Owner.

E. Miscellaneous: In all altered portions of the buildings, the Electronic Safety and Security Systems Trade shall remove or alter as necessary all existing work that does not fit with the new construction. All existing work or areas that are not altered shall be reconnected as required. Where indicated changes to non-safety and security facilities require minor safety and security systems changes, these changes shall be accomplished even if not specifically indicated. Only a small portion of the existing work is shown on the drawings. Contractors submitting proposals shall visit the site to determine the scope of work under this heading as no additional compensation will be granted because of existing conditions even though the existing conditions may not be indicated

on the drawings. Contractor shall thoroughly inspect the electronic safety and security systems in reworked areas and bring to the attention of the Engineer all defective or unserviceable material not scheduled for removal or replacement. Demolition shall not begin until the work schedule is approved by the Owner. The work shall be scheduled to prevent any disruption to the normal operations of the building. Refer to other Divisions for work phasing.

3.03 FIELD QUALITY CONTROL:

A. Verification [V]: Upon completion of the project, the Contractor shall submit a separate letter of certification (or compliance) to the Owner/Engineer that each of the following systems or equipment functions properly, conforms to all requirements of these specifications and all requirements of the manufacturer of the systems.

1. Section 28 10 00 – Electronic Access Control and Intrusion Detection
2. Section 28 20 00 – Electronic Surveillance
3. Section 28 31 00- Fire Detection And Alarm

3.04 MANUFACTURER'S ASSISTANCE:

A. Qualified technical representatives of manufacturers shall be available to visit the project and provide required assistance for any problems or trouble areas of any systems, material or equipment used in the project. Manufacturer's engineering assistance shall also be available for above problems or trouble areas. The Contractor shall purchase all materials, equipment or systems with these services included in the purchase price or otherwise be prepared to have the above service provided when needed or requested by the Engineer without additional compensation. Where one manufacturer's equipment constitutes the majority of the components or devices to make a system, the manufacturer's technically qualified representative shall inspect and accept the completed installation whether or not especially requested by the Engineer.

3.05 INSTRUCTION AND TRAINING OF OWNER'S REPRESENTATIVE:

A. The Division 28 Trades shall instruct and train the representatives of the Owner in the proper operation and maintenance of all elements of the Electronic safety and security systems. Competent representatives of the Contractor shall spend one (1) week for each Division 28 system. The times and locations for instruction and training to the Owner’s personal shall be set by the Owner at times and locations determined by the Owner over a period once the systems are functional for instruction and training. The instruction and training shall be given to all personal as deemed necessary by the Owner. The instruction and training shall prepare the Owner to fully operate and maintain all of the above systems.

3.06 CONSTRUCTION STATUS REPORT:

A. Each item of discrepancies noted on Construction Status Report prepared by the Architect/Engineer shall be answered in detail in writing by the Contractor before payment can be recommended.

3.07 DESCRIPTION OF ALTERNATES: Refer to the other Divisions of the Contract Specification (Manual) for description of alternates. **(On BCOM projects, use the words “additive bid items”.)**

END OF SECTION

APPENDIX A
LETTER OF INDEMNIFICATION

Project Name:

Project Location:

At the Contractors request, Stratus will provide electronic files of the Revit Models for their convenience and use, subject to the following terms and conditions:

Stratus electronic files are compatible with Autodesk Revit Product version for which they were designed. Autocad files will be provided in the Autocad 2018 DWG format. Stratus makes no representation as to the compatibility of these files with your hardware or your software.

Data contained on these electronic files is part of Stratus's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of project layout for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to Stratus. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Stratus, its officers, directors, employees, agents, or subconsultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless Stratus from all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to Addenda, Change Orders, or other revisions. Stratus makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed documents prepared by Stratus and the electronic files, the signed Contract Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm, and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

The use of the Revit Model files prepared by the Engineer shall not in any way negate the Contractor's responsibility for coordination with other trades or for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

All information added to the drawings by the Contractor shall be in a distinctively heavier pen weight and different font, such that all Contractor information can be clearly distinguished from the original files.

Any information added by the Contractor, which represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, Stratus reserves the right to remove all indicia of its ownership and/or involvement for each electronic display.

Under no circumstances shall delivery of the electronic files for use by you deemed a sale by Stratus, and Stratus makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall Stratus be liable for any loss of profit or any consequential damages.

The Engineer believes that no licensing or copyright fees are due to others on account of the transfer of the Revit Model files, but to the extent any are, the Contractor will pay the appropriate fees and hold the Engineer harmless from such claims as may arise.

Any purchase order number provided by the Contractor is for the Contractor's accounting purposes only. The Contractor's purchase order terms and conditions are void and are not a part of this agreement.

The Recipient further agrees that the drawing files will only be used in graphics preparation for the above-referenced project.

Company Name of Recipient: _____

Recipient's Designated Representative: _____

Title: _____

Signature: _____

Address: _____

Return to: Stratus
5228 Valleypointe Parkway, Suite 4
Roanoke, VA 24019
Stratus # 2026-0302

SECTION 28 0526

GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Equipment Grounding Conductor (EGC)

B. Isolated Grounding Conductor (IGC)

1.03 RELATED WORK:

A. Section 26 05 26 – Grounding and Bonding for Electrical Systems

B. Section 27 05 26 – Grounding and Bonding for Communication Systems

1.04 REFERENCES:

A. NFPA 70 (NEC), Article 250

1.05 DESCRIPTION:

A. An insulated equipment grounding conductor, color coded per section 26 05 19, and the NEC, shall be provided for each alternating current circuit without exception.

1.06 TESTS:

A. The equipment grounding conductor shall be tested for continuity and proper bonding to metallic equipment enclosures, outlet boxes, wiring devices and similar items.

PART 2 – PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Equipment Grounding Conductor (EGC):

1. Provide a separate insulated grounding conductor, color-coded as per Section 26 05 19, enclosed in the same raceway with the phase conductors for all alternating current circuits, even though not necessarily shown on the drawings.
2. The equipment grounding conductor shall be secured to the equipment enclosure at the source of power and at the apparatus being served by the alternating current supply.
3. The minimum size for the grounding conductor shall be as specified in Table 250.122 of NEC.
4. Existing alternating current circuits: If an equipment grounding conductor is not present in the existing feeder or branch circuit to be reworked, Division 28 shall provide new phase, neutral, and grounding conductors from the related panelboard to the indicated outlet.

B. Isolated Grounding Conductor (IGC):

1. Provide a separate insulated grounding conductor, color-coded as per Section 26 05 19, enclosed in the same raceway with the phase conductors, the neutral conductor and the equipment grounding conductor (EGC) for all alternating current circuits, which feed isolated grounding receptacles and panelboards, even though not necessarily shown on the drawings.

2. The isolated grounding conductor shall be secured to the isolated ground bar at the respective panelboard, and to each isolated ground receptacles' isolated grounding screw.
3. The minimum size for the isolated grounding conductor shall be the same as that specified for the equipment grounding conductor. Refer to Table 250.122 of the NEC.

END OF SECTION

SECTION 28 0528

PATHWAYS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Empty conduit system for Electronic Safety and Security Systems including Electronic Access Control and Intrusion Detection, and Electronic Surveillance.

1.03 RELATED WORK:

A. Section 26 05 00 – Common Work Results for Electrical

B. Section 26 05 26 – Grounding and Bonding for Electrical Systems

C. Section 26 05 33 – Raceway and Boxes for Electrical Systems

D. Section 26 05 36 – Cable Trays for Electrical Systems

E. Section 26 05 53 – Identification for Electrical Systems

F. Section 28 05 00 – Common Work Results for Electronic Safety and Security

G. Section 28 05 26 – Grounding and Bonding for Electronic Safety and Security Systems

H. Section 28 05 28 – Identification for Electronic Safety and Security

1.04 GENERAL OPERATION AND DESCRIPTION:

A. General: The Electronic Access Control and Intrusion Detection and Electronic Surveillance systems shall consist of a complete (partial) empty conduit system as indicated.

B. The raceway for this system shall be furnished and installed by the Division 26 electrical contractor in accordance with all related specification sections in Division 26 and 28. The Electronic Safety and Security System Trade shall coordinate this work with Division 26.

1.05 REFERENCES:

A. The complete installation, including additions and modifications, shall be in accordance with:
   1. National Electrical Code Article 800.
   2. Minimum standards of Electronics Industries Association (EIA).

PART 2 – PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General: The Contractor shall provide all conduit, junction boxes, and materials required for the installation of an empty conduit Electronic Safety and Security System in accordance with the specifications and drawings. Any material and/or equipment necessary for the proper operation of the system not specified or described herein shall be deemed part of this specification.

B. Wiring:
   1. Partial Conduit Raceway System: All wiring methods (conduit only) shall be in accordance with NFPA-70, Article 800, and all other codes specified herein. All wiring to be installed under another contract.
   2. Electronic Safety and Security Raceway System: Provide empty raceway system for motion detection, card readers, key pads, camera, and other electronic safety and security systems outlets and/or devices with conduit, boxes, cabinets, etc., as shown. Outlets, raceways and plates as specified in Division 26. All conduit runs to have long sweep radius elbows; condulets not permitted. There shall be a maximum of two 90° bends between outlets. Any run over 100'-0" in length shall have a pull box where approved by the Electronic Safety and Security System Trade. Provide fish wires as previously specified. Cabinets shall be flush or surface mounted as required.
   3. Furnish and install a 1" conduit from each outlet/device to the nearest accessible ceiling void.
   4. All Electronic Safety and Security systems conduits, boxes, etc., shall be grounded to the building grounding electrode system (BGES) and properly bushed.

C. All boxes, conduits, etc., shall be of proper size, as determined by the Electronic Safety and Security Trade and shall be clearly marked for easy identification.

3.02 FIELD QUALITY CONTROL:

A. The Contractor shall submit the following information to the Architect/Engineer.
   1. "As-built" conduit layout diagrams.

END OF SECTION

SECTION 28 0553

IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. Prepare and paint Division 28 equipment supports and miscellaneous materials located in Equipment Rooms, IDF's, MDF and other utility areas housing mechanical, electrical, safety and security equipment.

B. Identification of cabinets, racks, equipment and other system enclosures.

1.03 WORK NOT INCLUDED:

A. Painting of factory finished Division 28 Equipment such as Access Control, Electronic Surveillance, Fire Detection and Alarm, etc.

1.04 RELATED WORK:

A. Section 26 05 53 – Identification for Electrical Systems

B. Section 27 05 53 – Identification for Communications

C. Section 28 05 00 – Common Work Results For Electronic Safety And Security

D. Section 28 05 28 – Pathways for Electronic Safety and Security

E. Section 28 10 00 – Electronic Access Control and Intrusion Detection

F. Section 28 20 00 – Electronic Surveillance

G. Section 28 31 00 - Fire Detection And Alarm

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Except as otherwise specified, materials shall be the products of the following manufacturers:
   1. Sherwin-Williams
   2. Pratt and Lambert
   3. Devoe
   4. Benjamin Moore

2.02 MATERIALS:

A. Deliver all paints and materials to the project site in their original containers with all labels intact and legible at the time of use.

B. Sherwin-Williams Industrial Maintenance Coatings System 4000 products are listed below to establish color and a standard of quality.
   1. All Hangers and Supports: One coat Series 54 Gloss Black Alkyd Enamel.
   2. Factory Finished Equipment finishes shall be cleaned and properly touched up with equipment manufacturers touch-up paint unless finish is severely damaged or of unacceptable quality. In the latter case, the entire finish shall be restored in accordance with painted procedures herein specified.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

A. The work shall be accomplished by qualified mechanics skilled in the painting trade. Painting of equipment and other materials shall not commence until all testing is complete and systems are ready for operation. Materials shall be evenly spread, and smoothly flowed on without runs or sags. Each coat shall be thoroughly dry before application of succeeding coats.

3.02 PROTECTION OF WORK:

A. The painters shall protect all adjacent surfaces with drop covers during the process of painting. Upon completion, paint spots, if any, shall be removed from all surfaces not intended to be painted.

3.03 PREPARATION OF SURFACE:

A. Surfaces to be painted shall be completely dry before applying paint. Metal surfaces shall be cleaned with mineral spirits before applying materials. Rust and scale shall be removed by wire brushing or sanding. Galvanized surfaces shall be chemically treated with crystalline zinc phosphate in strict accordance with the manufacturer's recommendations. Surfaces shall not be painted when the temperature is, or is likely to be, near the freezing point, nor when they are exposed to hot sun.

3.04 IDENTIFICATION OF BOXES AND EQUIPMENT:

A. After **all** painting is completed, operating and control parts of the equipment and systems shall be properly identified with laminated engraved plastic nameplates fastened with sheet metal screws, bolts or permanent adhesive. Pressure sensitive tape is **not** acceptable. Identification symbols or designations shall be the same as shown on the contract documents.

B. Boxes; Concealed and Surface Mounted: Each enclosure shall be **neatly** identified by stencil marking, which shall indicate service contained, circuit numbers (or zone numbers). Stencil letters shall be upper case (Capital) not less than one half inch high and painted with Series 54 black gloss enamel. All fire alarm system boxes shall be painted red.

C. See Section 26 05 53 for identification of conduit associated with these systems.

D. The Division 28 Systems shall have an engraved informational laminated nameplate with the installing trade's name, telephone number and address for the Owner to obtain preventive maintenance, service or parts. The nameplate shall include the job order number, shop number or other identification, which will identify the related equipment.

If the above address and telephone number is a branch office, the main office or manufacturer's address and telephone number shall be included.

END OF SECTION

SECTION 28 3100

FIRE DETECTION AND ALARM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED:

A. A complete Automatic/Manual Microprocessor Based Fire Alarm system.

B. Connecting the Fire Suppression Systems to the Fire Alarm System.

C. Providing the duct mounted smoke detectors as indicated by Division 23.

1.03 RELATED WORK:

A. Division 23 – Heating, Ventilation, and Air Conditioning

B. Division 26 – Electrical

C. Division 27 - Communications

D. Section 28 05 00 – Common Work Results For Electronic Safety And Security

E. Section 28 05 26 – Grounding And Bonding For Electronic Safety And Security Systems

F. Section 28 05 53 – Identification For Electronic Safety And Security

1.04 GENERAL DESCRIPTION:

A. General: Provide a complete stand-alone microprocessor based emergency voice fire alarm system that displays all individual device address, custom messages, time and date, and event on a single LCD display. The fire alarm system shall be intelligent device addressable, analog detecting, low voltage and modular construction with multiplexed communication operation in full compliance with applicable codes and standards, as specified herein and indicated on the drawings. The system shall be wired, connected and left in first class operating condition. The system and system extensions, including graphic display annunciator(s), shall include, but not limited to the following for a complete operating system.

1. Master system CPU including all modules for fire detection; voice and strobe alarms, network for each system indicated.
2. RS-485-LAN, NFPA Style 7 configuration.
3. Circuit interface panels including all modules.
4. Power supplies, batteries and battery chargers.
5. Equipment enclosures.
6. Intelligent addressable manual pull stations, heat detectors, analog smoke detectors, alarm monitoring modules and supervised control modules.
7. Connection of conventional non-addressable devices and fire suppression systems as required for performance to this specification.
8. Annunciator panels and provisions for printer(s) and video display terminal(s).
9. Audible and visual evacuation signals.
10. Load control relays and enclosures.
11. Capable of color graphic displays and historical archiving.
12. Software and firmware as required to provide a complete functioning system.
13. Wiring and raceway, outlet boxes, and junction boxes.
14. Installation, testing and Certification and education labor.

15. MULTIPLEX, system driven remote LCD alpha numeric displays/commands center(s) (RCC) with the fire alarm system and remote locations, where indicated.
16. Interface modules and wiring from this system to an U.L. listed central station via digital alarm communicator provided by the Contractor.
17. Graphic remote annunciators for the building fire alarm and sprinkler flow alarms, supervision and trouble conditions.
18. Door release system

B. Fire Suppression System Connections and Interfaces:
   1. Connect the sprinkler fire suppression system to the Fire Alarm. Display the system's individual device address, custom messages, time and date, and event on LCD display of the fire alarm.
   2. Connect the Kitchen hood fire suppression with proper addressable interface modules to the fire alarm system.

C. Provide the duct mounted smoke detectors indicated on Division 23 drawing.

1.05 SYSTEM OPERATION:

A. Activation of any fire alarm initiating device shall cause the following actions and indications:
   1. Display a custom message describing the device originating the local alarm condition, at the local fire alarm control panel and including its related RCC LCD alpha numeric displays. The LCD annunciators shall display the alarm condition via unique messages as required by Owner. LED type annunciator displays, conventional and graphic style shall indicate alarm zoning as specified.
   2. Under general alarm operation, the FACP shall sound the audible signals, and flash the synchronized strobes in the building.
      a. Audible signals shall be silenceable from the FACP or its related RCC(s) by an alarm acknowledge switch, if permitted by the Authority having jurisdiction. The alarm acknowledge indication shall be transferred to a visual indicator on the FACP and related RCC (s) and the alarm signals shall resound for a subsequent alarm condition, reported by a different device.
      b. The FACP shall transmit a descriptive alarm to the DACT. The alarm transmission shall be capable of transmitting the minimum of the building address, the room, type of device, to inform the fire department of a manual, water-flow or detection alarm; and location.
      c. The FACP shall transmit the fully addressed alarm to all related remote command centers (RCC's) (**future**) terminal and printer.
      d. The Authority having jurisdiction shall be requested to allow the audible silencing of the tone portion of the evacuation alarm during the flow of any fire suppression system in the form of written authorization.
   3. Shut down the indicated air handling units within the smoke zone of alarm origin. A direct connection to Division 23 HVAC control circuits via Intelligent System (Addressable) interface modules is required.
   4. Start elevator "capture" (recall) per direction of the appropriate smoke detectors.
   5. Release doors being held open by fire alarm electromagnetic door holders.
   6. Record within the non-volatile system historical memory the occurrence of the event, the time and date of occurrence and the device initiating the event.

B. Activation of any supervisory circuit or fire suppression system abnormal, shall cause the following actions and indications:
   1. Display the origin of the supervisory condition report at each local alarm control panel and RCC alphanumeric LCD display, LED graphic displays and the **future** terminal and printer.
   2. Activate supervisory audible and visual signals as indicated audible signals shall be silenceable from the local fire alarm control and RCC panel by an alarm acknowledge switch. The supervisory indication shall be transferred to a visual indicator on the control panel and the supervisory signals shall resound for a subsequent supervisory condition, reported by a different device.
   3. Provide an addressed signal for all **supervisory** alarms.

4. Record within the non-volatile system historical memory and the **future** terminal and printer the occurrence of the event, the time of occurrence and the device initiating the event.

C. Receipt of a trouble report such as primary power loss, open or grounded initiating or signaling circuit wiring, open, grounded or shorted indication system wiring, device communication failure, battery disconnect at each new local fire alarm control panel shall cause the following actions and indications:

1. Display at the local alarm control panel and its related RCC and the **future** terminal and printer, an alphanumeric LCD display, with the origin of the trouble condition report.
2. Activate trouble audible and visual signals at the control panel and RCC panel as indicated on the drawings. Audible signals shall be silenceable from the related fire alarm control and its related RCC; by a trouble acknowledge switch. The trouble indication shall be transferred to a visual indicator on the control panel and the trouble signals shall resound for a subsequent trouble condition reported by a different device.
3. Provide an alarm system single auxiliary closure for the system **trouble** alarm. Offsite trouble reports for primary system power failure shall be automatically delayed for a period of time equal to 25% of the system standby battery capacity to eliminate spurious reports as a result of power fluctuations if permitted by the Authority having jurisdiction. Extend the fire alarm systems auxiliary contact via wiring to the DACT. This extension is in addition to the **future** terminal and printer.
4. Record within the non-volatile system historical memory the occurrence of the event, the time of occurrence and the device initiating the event.

1.06 QUALITY ASSURANCE

A. Source Quality Control: Materials and equipment shall be new, unused and U.L listed for use as a Fire Protective Signalizing System. The Fire Alarm System shall be listed and on file with the U.L. “Certificate of Compliance” upon completion of the system.

B. The system and components shall be supplied by one single manufacturer of established reputation and experience who shall have produced similar apparatus and who shall be able to refer to similar installations rendering satisfactory service.

C. The installing trade shall furnish the services of the Fire Alarm System manufacturer’s authorized technical representative who is qualified in the installation ad operation of the system being provided, and who shall be qualified and experienced in the inspection, testing, and maintenance of fires alarm systems. This local authorized technical representative shall be:

1. Factory trained and certified by manufacturer of the system being installed. Fire Alarm Trade shall submit “letter of certification” and proof of continuing education.
2. An on-site National Institute for Certification in Engineering Technologies (NICET) Fire Alarm certified **Level 3** Senior Engineering Technician to supervise on site NICET certified personnel.
3. Trained and qualified personnel employed by and organization listed by a national and Texas recognized testing laboratory (U.L.) for the servicing of maintaining and testing of fire alarm systems.

D. Certification shall be submitted verifying the ‘Fire Alarm Trade” is the manufacturer’s authorized dealer and installer has NICET certified personnel (indicate levels) and whose local project office is listed in the U.L. “Fire Protection Equipment Directory”.

E. The installing Trade shall furnish the services of the Fire Alarm System manufacturer’s authorized technical representative who is qualified in the installation and operation of the system being provided, and who is listed and on file with the Underwriters Laboratories (U.L.) Inc. The above Fire Alarm System manufacturers authorized technical representative shall be hereinafter known as the “Fire Alarm Technician” and his employer as the “Fire Alarm Trade”. The Fire Alarm Technician and his employer shall be capable of providing Underwriters Laboratories “Follow-Up Service” to identify that the fire alarm system is installed, tested and maintained in accordance with U.L.’s requirements and issue a U.L. “Certificate of Compliances” and NFPA-72 “Record of Completion”. The Fire Alarm Technician shall supervise the hook-up, final testing and adjustment of the system,

and provide instruction to the Owner's representative. The Fire Alarm System installation shall include wiring, components, connections, adjustment, testing and certification. The Installing Trade shall provide conduit, junction boxes and pull boxed as indicated; and required by Fire Alarm System manufacturer drawings or Fire Alarm Trade instructions. The Fire Alarm Trade shall furnish a low voltage wiring, special back boxes, cabinets, enclosures and similar items to the Electrical Trade for installation by the electrical trade in accordance with the fire alarm system manufacturer's drawings, Fire Alarm Trade instructions, and as indicated.

F. The Fire Alarm Trade shall also furnish a list of similar or equal installations and shall show company experience in this type of work.

1.07 REFERENCES:

A. The complete installation, including additions and modifications, shall be in accordance with:
   1. 2024 International Building Code (2024 IBC).
   2. National Electrical Code Article 760 & 800.
   3. National Fire Protection Association Standard 72, 13.
   4. Listed by Underwriters Laboratories, Inc.
   5. ASME/ANSI 117.1 (2017).
   6. All of the above references shall be current issue in effect at time of bid.
   7. Authority having jurisdiction's regulations, mandates and certification processes that are either part of applicable local government ordinance or applicable state law.

1.08 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 28 31 00.
   1. Shop Drawings: The Fire Alarm System manufacturer and Fire Alarm Trade shall provide a one-line riser diagram indicating route and conduit size, external wiring and connections of system proposed; furnish complete operating instructions, including schematic and wiring diagrams of the systems, engineering data sheets on each component and complete servicing data including part numbers of the various components. A schematic diagram of the complete systems is not shown on the contract documents.
   2. Product Data: Submit application, technical, and installation data.

B. Submit Operation and Maintenance Manuals in accordance with Section 28 31 00. The Operation and Maintenance Manuals' shall include the documentation as described in the 2019 NFPA 72 1-6.2.2.

C. **Substitution**: If the system being submitted by Contractor does not meet the specified points of the system operation, the Contractor shall state what specific points their system's operation differs from the specified points of the specified system operation. A differential report shall be submitted to the Design Engineers as part of the review process referencing every paragraph of this specification.

1.09 WARRANTY, SERVICES:

A. The Fire Alarm System manufacturer and Fire Alarm Trade shall warrant this system for a minimum of two (2) years from date of acceptance by the Design Engineer and Owner against defective parts and/or workmanship and shall provide parts and labor to fulfill this warranty at no cost to Owner.

B. Refer to Division 1 for submission of warranty.

C. Qualified service and parts shall be available to call on within a 50 mile basis.

D. The installing Trade shall include the cost of the above Fire Alarm System manufacturer's authorized technical representative providing maintenance of the installed system for a period of one (2) years, after final acceptance, in compliance with the Underwriters Laboratories (U.L.) Guidelines. On-the-premises service furnished at other than normal working hours shall also be available and shall be charged at normal hour labor rates. The above representative shall be prepared to offer Owner a service contract after the warranty period has ended through the Owner's procedural method and in accordance with NFPA 72.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. The system specified herein is based on the arrangement of a Notifier “NFS2-3030” series intelligent analog, voice, fire alarm system and how the system components are grouped into the basic panels, additional modules, auxiliaries and accessories. It is the intent of this specification to allow the total assembly of components to accomplish the specified operation and installation herein and not the exact arrangement of the various subcomponents. An alternative to the Notifier fire alarm system is the Edwards “EST3” fire alarm system. The alternates shall fully comply with the specifications without any qualifications or exceptions. Where proprietary items are involved, consideration will be given for acceptable alternatives.

2.02 MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE:

A. Main FACP or network node shall be a NOTIFIER Model NFS2-3030 and shall contain a microprocessor based Central Processing Unit (CPU) and power supply in a single board design. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. Operator Control
   1. Acknowledge Switch:
      a. Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the LCD display to the next alarm or trouble condition.
      b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
   2. Alarm Silence Switch:
      a. Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
   3. Alarm Activate (Drill) Switch:
      a. The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.
   4. System Reset Switch:
      a. Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
   5. Lamp Test:
      a. The Lamp Test switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personal.

C. System Capacity and General Operation
   1. The control panel or each network node shall provide, or be capable of expansion to 636 intelligent/addressable devices.
   2. The control panel or each network node shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.
   3. The control panel or each network node shall support up to 8 additional output modules (signal, speaker, telephone, or relay), each with 8 circuits for an additional 64 circuits. These circuits shall be either Class A (NFPA Style Z) or Class B (NFPA Style Y) per the project drawings.
   4. The system shall include a full featured operator interface control and annunciation panel that

shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad with easy touch rubber keys for the field programming and control of the fire alarm system.

5. The system shall be programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.
6. The system shall allow the programming of any input to activate any output or group of outputs. Systems that have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or require a laptop personal computer are not considered suitable substitutes. The FACP shall support up to 20 logic equations, including "and," "or," and "not," or time delay equations to be used for advanced programming. Logic equations shall require the use of a PC with a software utility designed for programming.
7. The FACP or each network node shall provide the following features:
    a. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
    b. Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.
    c. Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
    d. Nine sensitivity levels for alarm, selected by detector. The alarm level range shall be .5 to 2.35 percent per foot for photoelectric detectors and 0.5 to 2.5 percent per foot for ionization detectors. The system shall also support sensitive advanced detection laser detectors with an alarm level range of .03 percent per foot to 1.0 percent per foot. The system shall also include up to nine levels of Prealarm, selected by detector, to indicate impending alarms to maintenance personnel.
    e. The ability to display or print system reports.
    f. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification 20 times.
    g. PAS pre-signal, meeting NFPA 72 3-8.3 requirements.
    h. Rapid manual station reporting (under 3 seconds) and shall meet NFPA 72 Chapter 1 requirements for activation of notification circuits within 10 seconds of initiating device activation.
    i. Periodic detector test, conducted automatically by the software.
    j. Self optimizing pre-alarm for advanced fire warning, which allows each detector to learn its particular environment and set its prealarm level to just above normal peaks.
    k. Cross zoning with the capability of counting: two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
    l. Walk test, with a check for two detectors set to same address.
    m. Control-by-time for non-fire operations, with holiday schedules.
    n. Day/night automatic adjustment of detector sensitivity.
    o. Device blink control for sleeping areas.
8. The FACP shall be capable of coding main panel node notification circuits in March Time (120 PPM). Panel notification circuits (NAC 1, 2, 3 and 4) shall also support Two-Stage operation, Canadian Dual Stage (3 minutes) and Canadian Dual Stage (5 minutes). Two stage operation shall allow 20 Pulses Per Minute (PPM) on alarm and 120 PPM after 5 minutes or when a second device activates. Canadian Dual stage is the same as Two-Stage except will only switch to second stage by activation of Drill Switch 3 or 5 minute timer. The panel shall also provide a coding option that will synchronize specific strobe lights designed to accept a specific "sync pulse."
9. All strobe devices shall be synchronized and shall flash at the rate determined by the Local Authority Having Jurisdiction.

D. Central Microprocessor

1. The microprocessor shall be a high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, Flash memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.

2. The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.
4. A special program check function shall be provided to detect common operator errors.
5. An auto-program (self-learn) function shall be provided to quickly install initial functions and make the system operational.
6. For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download, and have the ability to upgrade the manufacturers (FLASH) system code changes. This program shall also have a verification utility, which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in compliance with the NFPA 72 requirements for testing after system modification.

E. System Display
1. The system shall support the following display mode options:
   a. 80 character display option. The display shall include an 80-character backlit alphanumeric Liquid Crystal Display (LCD) and a full PC style QWERTY keypad.
2. The display shall provide all the controls and indicators used by the system operator:
   a. The 80-character display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, ALARM ACTIVATE (drill), SYSTEM RESET, and LAMP TEST.
3. The display shall annunciate status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
4. The display shall also provide Light-Emitting Diodes.
   a. The 80-character display shall provide 8 Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM WARNING, SECURITY ALARM, SUPERVISORY SIGNAL, SYSTEM TROUBLE, DISABLED POINTS, and ALARM SILENCED.
   b. The 80-character display keypad shall be an easy to use QWERTY type keypad, similar to a PC keyboard. This shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
5. The system shall support the display of battery charging current and voltage on the 80-character LCD display.

F. Signaling Line Circuits (SLC)
1. Each FACP or FACP network node shall support up to two SLCs. Each SLC interface shall provide power to and communicate with up to 159 intelligent detectors (ionization, photoelectric or thermal) and 159 intelligent modules (monitor or control) for a loop capacity of 318 devices. The addition of the optional second loop shall double the device capacity, supporting a total of 636 devices. Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. CPU shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, prealarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

G. Serial Interfaces

1. The system shall include two serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Information Technology Equipment (ITE) peripherals.
    a. The system shall include an EIA-485 port for the serial connection of optional annunciators and remote LCD displays.
    b. The EIA-485 interface may be used for network connection to a proprietary-receiving unit.

H. Notification Appliance Circuit (NAC) Module
1. The Notification Appliance Circuit module shall provide four fully supervised Class A or B (NFPA Style Z or Y) notification circuits. An expansion circuit board shall allow expansion to eight circuits per module.
2. The notification circuit capacity shall be 3.0 amperes maximum per circuit and 6.0 amperes maximum per module.
3. The module shall not affect other module circuits in any way during a short circuit condition.
4. The module shall provide eight green ON/OFF LEDs and eight yellow trouble LEDs.
5. The module shall also provide a momentary switch per circuit that may be used to manually turn the particular circuit on or off or to disable the circuit.
6. Each notification circuit shall include a custom label inserted to identify each circuit's location. Labels shall be created using a standard typewriter or word processor.
7. The notification circuit module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal strips shall be UL listed for use with up to 12 AWG wire.
8. Each circuit shall be capable of, through system programming, deactivating upon depression of the signal silence switch.

I. Control Relay Module
1. The control relay module shall provide four Form-C auxiliary relay circuits rated at 5 amperes, 28 VDC. An expansion circuit board shall allow expansion to eight Form-C relays per module.
2. Each relay circuit shall be capable of being activated (change in state) by any initiating device or from any combination of initiating devices.
3. The relay module shall provide 8 green ON/OFF LEDs and 8 yellow LEDs (indicates disabled status of the relay).
4. The module shall provide a momentary switch per relay circuit that may be used to manually turn the relay ON/OFF or to disable the relay.
5. Each relay circuit shall include a custom label inserted to identify its location. Labels shall be created using a standard typewriter or word processor.
6. The control relay module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal blocks shall be UL listed for use with up to 12 AWG wire.

J. Enclosures:
1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The back box and door shall be constructed of 0.060 steel with provisions for electrical conduit connections into the sides and top.
3. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be site configured for either right or left hand hinging.

K. Power Supply:
1. An off-line switching power supply shall be available for the fire alarm control panel or network node and provide 6.0 amps of available power for the control panel and peripheral devices.
2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger for use with batteries up to 60 AH or may be used with an external battery and charger system. Battery arrangement may be configured in the field.
4. The power supply shall continuously monitor all field wires for earth ground conditions, and

shall have the following LED indicators:

Ground Fault LED
AC Power Fail LED
NAC on LED (4)

5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
6. The main power supply shall provide a battery charger using dual-rate charging techniques for fast battery recharge and be capable of charging batteries up to 60 AH.
7. All circuits shall be power-limited, per UL864 requirements.

L. Field Charging Power Supply (FCPS): The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.
   1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.
   2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two Style Y) shall be available for connection to the Notification devices.
   3. The FCPS shall include an attractive surface mount backbox.
   4. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.
   5. The FCPS include power limited circuitry, per 1995 UL standards.

M. Specific System Operations
   1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.
   2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 5 to 30 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.
   3. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
   4. Point Read: The system shall be able to display or print the following point status diagnostic functions:
      a. Device status
      b. Device type
      c. Custom device label
      d. View analog detector values
      e. Device zone assignments
      f. All program parameters
   5. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
   6. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 800 events. Up to 200 events shall be dedicated to alarm and the remaining events are general purpose. Systems that do not have dedicated alarm storage, where events are overridden by non-alarm type events, are not suitable substitutes. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.
   7. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be

annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

8. Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
9. Software Zones: The FACP shall provide 100 software zones, 10 additional special function zones, 10 releasing zones, and 20 logic zones.
10. The fire alarm control panel shall include a walk test feature. It shall include the ability to test initiating device circuits and notification appliance circuits from the field without returning to the panel to reset the system. Operation shall be as follows:
    a. Alarming an initiating device shall activate programmed outputs, which are selected to participate in walk test, for 3 seconds.
    b. Introducing a trouble into the initiating device shall activate the programmed outputs for 8 seconds.
    c. All devices tested in walk test shall be recorded in the history buffer.
11. Waterflow Operation
    a. An alarm from a waterflow detection device shall activate the appropriate alarm message on the main panel display, turn on all programmed notification appliance circuits and shall not be affected by the signal silence switch.
12. Supervisory Operation
    a. An alarm from a supervisory device shall cause the appropriate indication on the system display, light a common supervisory LED, but will not cause the system to enter the trouble mode.
13. Signal Silence Operation
    a. The FACP shall have the ability to program each output circuit (notification, relay, speaker etc) to deactivate upon depression of the signal silence switch.
14. Non-Alarm Input Operation
    a. Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.
15. Combo Zone
    a. A special type code shall be available to allow waterflow and supervisory devices to share a common addressable module. Waterflow devices shall be wired in parallel, supervisory devices in series.

2.03 SYSTEM COMPONENTS:

A. Programmable Electronic Speakers:
   1. Electronic speaker shall operate on 24 VDC nominal.
   2. Electronic speakers shall be field programmable without the use of special tools, at a sound level of at least 90 dBA measured at 10 feet from the device.
   3. Shall be flush mounted as shown on plans.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971, be fully synchronized, and shall meet the following criteria:
   1. The maximum pulse duration shall be 2/10 of one second.
   2. Strobe intensity shall meet the requirements of UL 1971.
   3. The flash rate shall meet the requirements of UL 1971.
   4. Visual devices shall be SpectrAlert series.

C. Audible/Visual Combination Devices:
   1. Shall meet the applicable requirements of Section A listed above for audibility.
   2. Shall meet the requirements of Section B listed above for visibility.
   3. Audible/Visual devices shall be SpectrAlert series.

D. Duct Smoke Detectors
   1. Duct smoke detectors shall be a 24 VDC type with visual alarm and power indicators, and a reset switch. Each detector shall be installed upon the composite supply/return air ducts(s), with properly sized air sampling tubes.

E. Waterflow Indicator:
   1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
   2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
   3. All waterflow switches shall come from a single manufacturer and series.
   4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
   5. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which changes the direction of the flow and a minimum of three (3) feet from a valve.

F. Sprinkler and Standpipe Valve Supervisory Switches:
   1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
   2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
   3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
   4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4 inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.
   5. The switch housing shall be finished in red baked enamel.
   6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
   7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.
      a. This unit shall provide for each zone: alarm indications, using a red alarm a yellow trouble long-life LEDs and control switches for the control of fire alarm control panel functions. The annunciator will also have an ON-LINE LED, local piezo electric signal, local acknowledge/lamp test switch, and custom slide-in zone/function identification labels.
      b. Switches shall be available for remote annunciation and control of output points in the system, system acknowledge, telephone zone select, speaker select, global signal silence, and global system reset within the confines of all applicable standards.

G. Alphanumeric LCD Type Annunciator:
   1. The alphanumeric display annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.
   2. The LCD annunciator shall display all alarm and trouble conditions in the system.
   3. An audible indication of alarm shall be integral to the alphanumeric display.
   4. The display shall be UL listed for fire alarm application.
   5. It shall be possible to connect up to 32 LCD displays and be capable of wiring distances up to 6,000 feet from the control panel.
   6. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. This is a two-wire loop connection and shall be capable of distances to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.
   7. The system shall allow a minimum of 32 terminal mode LCD annunciators. Up to 10 LCD annunciators shall be capable of the following system functions: Acknowledge, Signal Silence and Reset, which shall be protected from unauthorized use by a keyswitch or password.
   8. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

H. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

I. Universal Digital Alarm Communicator Transmitter (UDACT). The UDACT is an interface for communicating digital information between a fire alarm control panel and an UL-Listed central station.

1. The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet. Optionally, the UDACT shall have the ability for remote mounting, up to 6,000 feet from the fire alarm control panel. The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status. Systems that utilize relay contact closures are not acceptable.
2. The UDACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to three different telephone numbers.
3. The UDACT shall be completely field programmable from a built-in keypad and 4 character red, seven segment display.
4. The UDACT shall be capable of transmitting events in at least 15 different formats. This ensures compatibility with existing and future transmission formats.
5. Communication shall include vital system status such as:
    - Independent Zone (Alarm, trouble, non-alarm, supervisory)
    - Independent Addressable Device Status
    - AC (Mains) Power Loss
    - Low Battery and Earth Fault
    - System Off Normal
    - 12 and 24 Hour Test Signal
    - Abnormal Test Signal (per UL requirements)
    - EIA-485 Communications Failure
    - Phone Line Failure
6. The UDACT shall support independent zone/point reporting when used in the Contact ID format. In this format the UDACT shall support transmission of up to 2,040 points. This enables the central station to have exact details concerning the origin of the fire or response emergency.

J. Field Wiring Terminal Blocks

For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

2.04 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices – General:

1. Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159.
2. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute.
3. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.
4. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
5. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust

sensitivity.

6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Bases shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.
8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
10. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
11. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
12. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.

B. Addressable Double-Action Manual Fire Alarm Box (manual station)

1. Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

C. Intelligent Photoelectric Smoke Detector:

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

D. Intelligent Thermal Detectors:

1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Intelligent Duct Smoke Detector:

1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

F. Addressable Dry Contact Monitor Module:

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that

shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

G. Two Wire Detector Monitor Module:

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

H. Addressable Control Module:

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances.
2. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation.
3. Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised UL listed remote power supply.
4. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

I. Addressable Relay Module:

1. Addressable Relay Modules shall be available for HVAC control and other building functions. The relay shall be form C and rated for a minimum of 2.0 Amps resistive or 1.0 Amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

J. Isolator Module:

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
4. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.05 BATTERIES:

A. The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.

B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

C. If necessary to meet standby requirements, external battery and charger systems may be used.

2.06 FACP (CONTROL) RELAYS & CONTACTORS:

A. Provide for the control of air handler motor starters, control relays and contractors as follows:

1. All relays and contractors shall be supervised as required by NFPA 101 and mounted within three feet of the device controlled.
2. Refer to Section 26 20 00 for relays and Contactors.

2.07 GRAPHIC REMOTE ANNUNCIATORS:

A. Graphic Remote Annunciators shall be flush or semi-flush mounted with LED indicators for alarm, supervision, trouble conditions for all initiating alarm zones as scheduled. Provide weatherproof versions where indicated to be exposed to the exterior. The sprinkler flow graphic remote annunciators shall be WSA “ION TWO” series. The fire alarm graphic annunciator shall be WSA “FAA-200" LED series. Acceptable equal graphic display annunciators will be given consideration.

2.08 ELECTROMAGNETIC DOOR HOLDERS:

A. Provide where indicated on the drawings, 24 volt wall mounted electromagnetic door holders, Notifier FM series, controlled from the fire alarm control panel, to release when the general alarm is activated. The holders shall be furnished complete with all adapters, extensions and accessories necessary to suit the door limits of travel and distances to the wall, and shall be coordinated with the Architect for locations and mounting height. Wall or floor mounted door holders are indicated on the drawings. All wiring shall be concealed.

2.09 DOCUMENT CABINET

A. Provide one (1) wall mounted, lockable document cabinet per NFPA 72. Document cabinet shall be red with white lettering that states “SYSTEM RECORD DOCUMENTS”. Locate the cabinet on wall adjacent to fire alarm control panel. Provide final approved shop drawings, contract fire alarm drawings, owner’s manuals, etc. in document box.

PART 3- EXECUTION

3.01 INSPECTION:

A. The Fire Alarm Trade shall be responsible for all arrangements for testing and approval of the Fire Alarm System by the Authority having jurisdiction before the Fire Alarm System is accepted by the Project Manager.

3.02 INSTALLATION:

A. General: The Fire Alarm Trade shall provide all new equipment, accessories and material required for the installation of the fire alarm system in accordance with the specifications and drawings. Any material and/or equipment necessary for the proper operation of the system that is not specified or described herein shall be deemed part of this specification.

B. Wiring Methods:
1. All wiring methods shall be in accordance with NFDA-70, Article 760, and all other codes specified herein.
2. Provide proper number and size of wires as required for proper operation of the system in accordance with the system’s manufacturer’s instructions and the above codes.
3. All non-power limited wiring shall be installed in a separate conduit system, as specified in Section 26 05 19.
4. All shielded power limited cable shall be installed in a partial conduit system per NEC Article 760 and as specified in Section 26 05 23 for plenum and non-plenum applications.
5. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be permitted in fire alarm conduits, (except in the cable tray, in accordance with the NEC and if permitted by the TIA/EIA standards for compatibility with other listed TIA/EIA systems).
6. Wiring splices are to be avoided to the extent possible, and if needed they must be made only in junction boxes and shall be crimp connected.
7. Transposing or changing color coding of wires shall not be permitted.

8. Crimped type connections are not acceptable for final connections at terminating locations.
9. All conductors shall be labeled on each end with "E-Z markers" or equivalent.
10. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its termination.
11. Cabinet terminals shall be numbered. All controls, function switches, etc., shall be clearly labeled on all equipment panels.
12. All connections to panels, devices and detectors shall be made with screw terminal connections, or method approved by fire alarm manufacturer.
13. All wiring shall be checked and tested to ensure that there are no grounds, opens or shorts.
14. All fire alarm addressable signal line circuits (SLC) shall be Style 6 (pre-1988 Class A). Return circuit route shall **not** be in the same conduit.
15. The wiring for the fire alarm system is not shown on the drawings. The actual circuit routing of the fire alarm system shall be by the Fire Alarm Trade based on the location of the devices, circuit limitations and wire limitations.
16. All fire alarm hard wired indicating appliance circuits (IAC) shall be style Z (pre-1988 Class A).
17. All fire alarm signal line circuits, and other wiring leaving the building location shall have surge arresters or transient protectors as required by U.L., NEC and equipment manufacturer.
18. All fire alarm systems' wiring 100 volts and less is part of Section 26 31 00. All fire alarm systems' wiring 101 volt and above is part of Division 26.
19. All boxes, conduits, etc., shall be of proper size, as determined by the Fire Alarm System Trade, shall be clearly marked for easy identification, continuously grounded together and bonded to the existing building grounding electrode system (BGES). The Fire Alarm Trade shall furnish special boxes to the Electrical Trade for installation by the Electrical Trade.

C. Duct Mounted Smoke Detectors:
1. Duct mounted smoke detectors that are indicated on Division 23 drawings, shall be furnished and installed by Section 28 31 00.
2. The exact quantity and location shall be obtained from the Division 23 drawings including, but not limited to diagrams, plans and details.
3. Division 28 shall provide the Interlock for the related air handler, fan and/or motorized duct smoke damper through the auxiliary relay (s) of the duct mounted smoke sensors or Intelligent System (Addressable) interface module, as indicated by Division 23 schematics.
4. Division 23 shall install the sampling tubes and mounting plate. The remote alarm lamp and reset test station shall be located in the occupied area below or adjacent to the unit. This station shall be accessible from the floor.
5. The remote alarm lamp and reset test station shall be located in the occupied area or adjacent to the unit. This station shall be mounted on adjacent wall at 60” AFF and shall be readily accessible.

D. The activation of smoke sensor(s) shall operate through an Intelligent System (Addressable) interface module or base relay to the remote alarm indicator on the ceiling above the entrance door to the area. Individual sensor's base can drive one (1) remote alarm indicator without a relay.

E. All smoke sensors shall be installed only after the final clean up by all of the Trades, but before inspection by the Local Authority Having Jurisdiction. No compensation shall be given for smoke sensors that are required to be replaced if installed before this date.

F. All ceiling smoke and heat sensors shall be properly located from HVAC supply and return discharges per NFPA 72E distances.

G. Remote Command Centers (RCC): Provide remote LCD alpha-numeric display/command center(s) as indicated on the drawings.

H. All fire alarm systems' Intelligent System (Addressable) interface modules shall be mounted adjacent to the controlled equipment. Auxiliary relays located in ceiling mounted sensor bases shall be in the same room as the controlled equipment and within the NFPA limits.

I. Each application for visual indicating appliances (strobe) intensity requirements shall meet or exceed ADAAG guidelines, ADAAG General Section 2.2 Equivalent Facilitation, NFPA 72 (Chapter

6) and ANSI 117.1. All visual indicating appliances shall be synchronized to minimize adverse neurological stimulation. The visual and audible indicating appliances shall be separately circuited for audible silencing. Visual signals shall be mounted at the “ADA not to exceed” height of 88 inches above the highest level of the finish floor or six inches below the ceiling, whichever is lower unless the Authority having jurisdiction indicates otherwise. The subscript number adjacent to the indicating appliance indicates the minimum required candela for the space.

J. The sprinkler flow and fire alarm remote graphic display(s) shall be reviewed by the Architect, Engineer and Owner before fabrication. The Fire Alarm Trade shall provide room, area and building description lettering in accordance with the Owner’s instructions.

K. The sprinkler flow remote waterproof alarm bell and strobe shall only indicate water flow alarm.

L. The fire alarm remote alarm contact shall be connected to the UDACT. Upon alarm (or trouble) the digital communicator shall transmit the proper signal to the Owner-contracted central station.

M. Connect the sprinkler fire suppression system to the FACP, through Intelligent System (Addressable) interface modules, for flow, supervision and trouble complete with anti-tamper switches as required. Sprinkle flow switches (FS or PS) and electrically supervised valves (ESV) are indicated on Division 21 drawings and are furnished in-place. Connect the Elevator Pre-Action System in the same manner, including the heat detection and supervision.

N. Connect the kitchen hood chemical fire suppression systems to the FACP through Intelligent System (Addressable) interface modules, for flow, supervision and trouble. These devices shall be connected to the fire alarm system with intelligent system interface modules for general alarm, supervision and trouble as required.

O. Provide wall mounted magnetic door holders where indicated. Connect to 24 VDC output without standby batteries. All door holders shall release on general alarm or loss of normal 24 VDC power. Provide armature extensions and adapters as required and coordinate with door swing arc. Holders shall be mounted eight (8) inches below the top of the door. All wiring shall be concealed. Verify exact location and mounting height with Architect to prevent damage to doors (s).

P. In addition to the system devices shown on the drawings, the Contractor shall include a total of five (5) additional smoke detectors, five (5) additional manual pull stations, five (5) additional duct smoke detectors, five (5) additional visual only indicating appliances, and five (5) additional horn/strobe indicating appliances. These additional devices shall be spare to be turned over to the Owner at the completion of the project. The Contractor shall install the above additional devices, as required by the Local Authority Having Jurisdiction, at no additional cost.

3.03 TECHNICAL ASSISTANCE:

A. Instruction: The Fire Alarm Technician shall instruct the Authority having jurisdiction and the Owner and Fire Department personnel on the correct operation of the system after the installation is completed.

3.04 FIELD QUALITY CONTROL:

A. General: Upon completion of the installation, the Fire Alarm Systems Technician shall perform all necessary NFPA tests and adjustments. The above representative shall then submit a Record of Completion and an Underwriters Laboratories (U.L.) Certificate of Compliance to the Owner and Design Engineers that each system and the network functions and conforms to all the requirements of the manufacturer of the equipment, the Contract Documents, and all requirements of the Uniform Statewide Building Code including IBC 2003 907.2.10.4 acceptance test for the type of building in which the system is installed. The U.L. "Certificate of Compliance" shall be filed at U.L. for inspection by the insurance underwriters and all other authorities. The NFPA 72 "Record of Completion" shall be filed with the Local Authority having jurisdiction.

B. The Fire Alarm System Trade shall enlist the service of a 3rd party inspector to perform all electrical and mechanical tests of the system. The Fire Alarm System Trade shall notify the Owner and Engineer in writing one (1) week prior to 3rd party testing. Testing agency shall verify functionality,

location, and levels of system control panel, components, audible, and visual indicating appliances. Testing agency shall be submitted and approved by Loudoun County Building and Development department prior to selection.

C. The Fire Alarm Technician shall perform all electrical and mechanical tests required by the fire alarm systems manufacturer's form. All test and report costs shall be in the Contract price. A checkout report shall be prepared by the installation technicians and submitted in triplicate, one copy of which will be registered with the equipment manufacturer. The report shall include, but not be limited to:
   1. A complete list of equipment installed and wired.
   2. Indication that all equipment is properly installed and functions and conforms with these specifications.
   3. Tests of individual zones and addressable devices as applicable.
   4. Serial numbers, locations by zone and model number for each installed detector.
   5. Voltage (sensitivity) settings for each photoelectric detector as measured in place with the HVAC system operating.
   6. IBC 709.2.10.4 Acceptance Test
   7. Technician's name, certificate number and date.

D. After completion of all tests and adjustments listed above, the Fire Alarm Trade shall submit the following information to the Design Engineers.
   1. "As-built" conduit layout diagrams including wire color code and/or tag number.
   2. Complete "as-built" wiring diagrams.
   3. Detailed catalog data on all installed system components.
   4. Copy of the test report described in Par. B.

E. Final tests and inspection shall be held in the presence of the Project Manager and to his or her satisfaction. The Fire Alarm Trade shall supply personnel and required auxiliary equipment for this test without additional cost.

F. The completed smoke detection system shall be tested to ensure that it is operating properly. This test will consist of exposing the installed units to a standard fire test. Failure of the devices to sense the smoke shall be considered a failure of the system and all detectors in that system shall be readjusted or replaced. Acceptance of the system shall also require a demonstration of the stability of the system. This shall be adequately demonstrated if the system operates for a ninety (90) day test period without any unwarranted alarms. Should an unwarranted alarm(s) occur, the Fire Alarm Trade shall readjust or replace the detector(s) and begin another ninety (90) day test period. As required by the Design Engineers, the Fire Alarm Trade shall recheck the detectors using the fire test after each readjustment or replacement of detectors. This test shall not start until Owner has obtained beneficial use of the building under tests.

G. If the requirements provided in the paragraph above are not completed within one (1) year after beginning the tests described therein, the Fire Alarm Trade shall replace the system with another acceptable manufacturer and the process repeated until acceptance of the equipment by the Design Engineers, Owner and Project Manager.

H. After completion of all tests and adjustments listed above, the Fire Alarm Trade shall turn over the Fire Alarm System data disk to the Owner. The data disk will be considered to be the property of the Owner upon acceptance of the Fire Alarm System by the Project Manager.

END OF SECTION

SECTION 31 05 16

AGGREGATES FOR EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

This section of the specifications describes the various classes of Aggregate Fill. All of the classes of Aggregate Fill contained in this specification may not be used on this project. The classes of Aggregate Fill used on this project are shown on the drawings or specified in other sections of the specifications. This specification section does not include installation. Installation of Aggregate Fill is included in other sections of the specifications and/or on the drawings.

1.02 QUALITY ASSURANCE

CLASSIFICATION TESTING

A. CONTRACTOR TESTING

1. Arrange and pay for the services of an independent testing laboratory to sample and test proposed Aggregate Fill materials.
2. Submit the test results to the Engineer and obtain approval prior to providing Aggregate Fill.

B. OWNER TESTING

The Owner shall arrange and pay for additional testing on the Aggregate Fill after delivery to the project site as determined necessary by the Engineer.

C. CONTAMINATION CERTIFICATION

1. Obtain a written, notarized certification from the Supplier of each proposed Aggregate Fill source stating that to the best of the Supplier's knowledge and belief there has never been contamination of the source with hazardous or toxic materials.
2. Submit these certifications to the Engineer prior to proceeding to furnish Aggregate Fill to the site. The lack of such certification on a potential Aggregate Fill source shall be cause for rejection of that source

1.03 STANDARDS

Aggregate Fill shall be classified into the appropriate class listed below according to ASTM testing procedures as specified for the various classes.

American Society for Testing Materials standards:

ASTM C33 Specification for Concrete Aggregates
ASTM C88 Test Method for soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C125 Terminology Relating to Concrete and Concrete Aggregates
ASTM C131 Test Method for Resistance to Degradation of Small-Size coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C535 Test Method for Resistance to Degradation of Large-Size coarse Aggregate by

Abrasion and Impact in the Los Angeles Machine
ASTM D448 Classification for Standard sizes of Aggregate for Road and Bridge Construction

PART 2 - PRODUCTS

2.01 MATERIALS; CLASSIFICATIONS

A. CLASS I AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 57:

Sieve Size Square Opening	Percent Passing
1-1/2"	100
1"	95 - 100
1/2"	25 - 60
No.4	0 - 10
No. 8	0 - 5

B. CLASS 2 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM Method C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 67:

Sieve Size Square Opening	Percent Passing
1"	100
3/4"	90 - 100
3/8"	20 - 55
No.4	0 - 10
No.8	0 - 5

C. CLASS 3 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 7:

Sieve Size Square Opening	Percent Passing
3/4"	100
1/2"	90 - 100
3/8"	40 - 70
No.4	0 - 15
No.8	0 - 5

D. CLASS 4 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt,

clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM Method C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 467:

Sieve Size Square Opening	Percent Passing
2"	100
1-1/2"	95 - 100
3/4"	35 - 70
3/8"	10 - 30
No. 4	0 - 5

E. CLASS 5 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 357:

Sieve Size Square Opening	Percent Passing
2-1/2"	100
2"	95 - 100
1"	35 – 70
1/2"	10 - 30
No. 4	0 - 5

F. CLASS 6 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 1:

Sieve Size Square Opening	Percent Passing
4"	100
3 - 1/2"	90 - 100
2 - 1/2"	25 - 60
1 - 1/2"	0 - 15
3/4"	0 - 5

G. CLASS 7 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and shall have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 6:

Sieve Size Square Opening	Percent Passing
1"	100

3/4"	90 - 100
1/2"	20 - 55
3/8"	0 - 15
No.4	0 - 5

H. CLASS & AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and shall have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D448, size number 56:

Sieve Size Square Opening	Percent Passing
1-1/2"	100
1"	90 - 100
3/4"	40 - 85
1/2"	10 - 40
3/8"	0 - 15
No. 4	0 - 5

I. CLASS 9 AGGREGATE FILL: Consist of washed and screened gravel and natural sands or sands manufactured by crushing stones complying with the requirements of ASTM C33, "Standard Specifications for Concrete Aggregates", except that the gradation shall be as follows:

Sieve Size Square Opening	Percent Passing
1/2"	100
3/8"	95 - 100
No. 4	80 - 95
No. 8	65 – 85
No. 16	50 – 75
No. 30	25 – 60
No. 50	10 – 30
No. 100	0 - 10

Class 9 Aggregate Fill shall have not more than 45% passing any sieve and retained on the next consecutive sieve of those shown above, and its fineness modulus, as defined in ASTM C125, shall be not less than 2.3 nor more than 3.1.

J. CLASS 10 AGGREGATE FILL: Consist of washed and screened natural sands or sands manufactured by crushing stones complying with the requirements and tests of “Standard Specifications for Concrete Aggregates”, ASTM C33. The gradation as included in ASTM C33 is as follows:

Sieve Size Square Opening	Percent Passing
3/8”	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

Class 10 Aggregate Fill shall have not more than 45% passing any sieve and retained on the next consecutive sieve of those shown above, and its fineness modulus, as defined in ASTM C125, shall be not less than 2.3 nor more than 3.1.

K. CLASS 11 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable material and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation:

Sieve Size Square Opening	Percent Passing
1-3/4"	100
7/8"	65 - 90
3/8"	50 - 70
No.4	35 - 55
No.40	15 - 30
No.100	0 - 12 (Wet Sieve Method)

L. CLASS 12 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable material and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation:

Sieve Size Square Opening	Percent Passing
1-1/2”	100
1"	85 - 100
3/4"	60 - 95
3/8"	50 - 80
No.4	40 - 65
No.16	20 - 40
No.100	0 - 12 (Wet Sieve Method)

M. CLASS 13 AGGREGATE FILL: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable material and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and shall meet the following gradation:

Sieve Size Square Opening	Percent Passing
1-3/4"	100
7/8"	65 - 90
3/8"	50 - 70
No. 4	35 - 55
No. 40	15 - 30
No. 100	0 - 3 (Wet Sieve Method)

N. CLASS 14 AGGREGATE FILL. Consist of durable particles of crushed stone free of silt, clay, or other unsuitable material and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five

(5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation:

Sieve Size Square Opening	Percent Passing
1-1/2"	100
1"	85 - 100
3/4"	60 - 95
3/8"	50 - 80
No.4	40 - 65
No. 16	20 - 40
No.100	0 - 3 (Wet Sieve Method)

O. CLASS 15 AGGREGATE FILL. Consist of durable particles of silica sand, washed clean chemically inert, and packaged by the Supplier. The material shall meet applicable regulatory requirements for monitor well filter pack. The source of the material shall be approved by the Engineer and shall meet the following gradation requirements.

Sieve Size Square Opening	Percent Passing
No.20	98 - 100
No.40	0 - 2

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment, and incidentals necessary to perform operations in connection with clearing, grubbing, and disposal of cleared and grubbed materials.

1.02 QUALITY ASSURANCE; DEFINITIONS

A. CLEARING: Clearing is defined as the removal of trees, shrubs, bushes, and other organic matter at or above original ground level.

B. GRUBBING: Grubbing is defined as the removal of stumps, roots, boards, logs, and other organic matter found at or above ground level.

PART 2 - PRODUCTS [Not Used]

PART 3 - EXECUTION

3.01 PREPARATION

A. Mark areas to be cleared and grubbed prior to commencing clearing operations. Engineer shall approve clearing and grubbing limits prior to commencement of clearing operations.

B. Trees and shrubs outside of the clearing limits, which are within 10' of the clearing limits, shall be clearly marked to avoid damage during clearing and grubbing operations.

C. Remove trees and brush outside the clearing limits, but within the immediate vicinity of the work, upon receipt of approval by the Engineer, when the trees or brush interfere with or retard the progress of construction operations.

D. Clearly mark trees and shrubs within the clearing limits, which are to remain, and protect the trees and shrubs from damage during the clearing and grubbing operations.

E. The clearing limits shall not extend beyond the project limits.

F. Establish the clearing limits as follows:

1. Embankments plus 10' beyond the top of the excavation.
2. Excavations plus 5' beyond the top of the excavation.
3. Concrete structures plus 10' beyond the edge of the footing.
4. New roadways and new parking areas plus 5' beyond the edge of pavement.
5. Retaining walls plus 10' beyond the edge of the footing.
6. Underground utility trench top width plus 8'.

G. Establish the grubbing as follows:

1. Embankments plus 2' beyond the toe of the embankment.
2. Concrete structures plus 2' beyond the edge of the footing.
3. New roadways and new parking areas plus 1' beyond the edge of pavement.
4. Retaining walls plus 2' beyond the edge of the footing.

3.02 INSTALLATION

A. CLEARING

Clearing shall consist of the felling, cutting up, and the satisfactory disposal of trees and other vegetation, together with the down timber, snags, brush, rubbish, fences, and debris occurring within the area to be cleared.

B. GRUBBING

1. Grubbing shall consist of the removal and disposal of stumps and roots larger than 1" in diameter.
2. Extend grubbing to the depth indicated below: In the case of multiple construction items, the greater depth shall apply.

a) Footings - 18" below the bottom of the footing.
b) Walks - 12" below the bottom of the walk.
c) Roads and Taxiways - 18" below the bottom of the subgrade.
d) Parking Areas - 12" below the bottom of the subgrade.
e) Runways - 24" below the bottom of the subgrade.
f) Embankments - 24" below existing ground.
g) Concrete Structures - 18" below the bottom of the concrete.
h) Retaining Walls - 18" below the bottom of the footing.

3.03 FIELD QUALITY CONTROL

BURNING NOT PERMITTED

Completely remove timber, logs, roots, brush, rotten wood, and other refuse from the Owner's property. Disposal of materials in streams shall not be permitted and no materials shall be piled in stream channels or in areas where it might be washed away by floods. Timber within the area to be cleared shall become the property of the Contractor, and the Contractor may cut, trim, hew, saw, or otherwise dress felled timber within the limits of the Owner's property, provided timber and waster material is disposed of in a satisfactory manner. Materials shall be removed from the site daily unless permission is granted by the Engineer to store the materials for longer periods.

END OF SECTION

SECTION 31 14 00

SITE PREPARATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Clearing the site of vegetation, site improvements and obstructions to make way for new work.

1.02 PROJECT CONDITIONS

A. Existing Conditions: Contractor shall visit the site and verify the nature and extent of clearing work required.

B. Protection: Contractor shall be responsible for the protection of adjoining property and improvements outside the limits of the work. Protect paving from damage by heavy equipment and trucks. Take precautions to prevent injury to trees which are to remain.

PART 2 - PRODUCTS [Not used]

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Clearing:

1. Remove trees, shrubs, and other vegetation from within the area of the site where shown on the drawings. Grub out roots to a depth of at least 18 inches below natural grade.
2. Dig out and remove buried obstructions to a depth of 24" below natural grade or 24" below the intended excavation elevation, whichever is lower.
3. Unless otherwise specified on the drawings, trees with calipers greater than 3" shall not be cleared (removed).

B. Pavement Removal

Bituminous and concrete pavements shall be removed to neatly sawed edges. Saw cuts shall be made full depth. If a saw cut in concrete pavement falls within 3' of an existing score joint, construction joint, saw joint, cold join, expansion joint, or edge, the concrete shall be removed to that joint or edge. All saw cuts shall be parallel and/or perpendicular to the line of existing pavement. If an edge of a cut is damaged subsequent to saw cutting, the concrete shall again be sawed to a neat, straight line for the purpose of removing the damaged area.

C. Disposal:

1. Clean up and remove from the site existing stumps, logs, broken paving rubble, and trash.
2. Clean up and remove from the site the stumps, logs, broken paving, rubble, and debris resulting from the clearing and grubbing operations.
3. Material to be wasted shall be legally disposed of off-site.
4. Burning of combustible materials on the site will not be permitted.

5. Remove and dispose of excess soil off site in a legal manner. No extra pay.

3.02 BACKFILLING

A. All holes, cavities, and depressions in the ground caused by site preparation operations will be backfilled and tamped to normal compaction and will be graded to prevent ponding of water and to promote drainage. In areas that are to be immediately excavated, the Architect/Engineer may permit holes, etc., to remain open.

3.03 STORM WATER MANAGEMENT PRACTICES

A. During the progress of the work, the contractor shall maintain existing storm water erosion and silt control measures in place at the site and shall provide additional erosion control barriers, silt fences, and other techniques in accordance with best management practices. Refer to Section 31 23 00 for additional requirements and land disturbance permit requirements.

END OF SECTION

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipments and incidentals necessary to perform operations in trenching, pipe bedding, backfilling, clearing, grubbing and site preparation, handling, storage, transportation and disposal of excavated material; pumping and dewatering, preparation of subgrades, protection of adjacent property; fills, grading; and other appurtenant work. Trenching, backfilling, and pipe embedment procedures shall be in full compliance with Section 31 41 33, Trench Shielding. Earth removed from excavations and which is not required for backfill shall be removed from the site by the Contractor at his own expense unless arrangements arc made with the Owner through his representative to allow disposal on site. If permitted, the Contractor shall dump and spread excess earth in a manner agreed upon by the Contractor and the Owner Excavation, other than trench excavation and embankment fills are not part of this specification section

1.02 QUALITY ASSURANCE

CLASSIFICATION

A. Excavations shall include material of whatever nature encountered, including but not limited to clays, sands, gravels, conglomeritic boulders, weathered clay shales, rock, debris and abandoned existing structures. Excavation and trenching shall include the removal and subsequent handling of materials excavated or otherwise handled in the performance of the work.

B. Bidders must satisfy themselves as to the actual existing subsurface conditions prior to the submittal of a proposal to complete the proposed work.

C. Trench excavation shall consist of excavation to the lines and grades indicated, required for installation of the pipe, pipe bedding, backfill, and to accommodate trench safety systems

1.03 SUBMITTALS

A. Submittals shall be in accordance with SECTION 01 33 23 – Shop Drawings, Product Data, and Samples and SECTION 01 23 00 – Alternates, Submittals and shall include:

1. Sieve analysis on embedment materials.
2. Test results indicating soil resistivity for embedment material used on metal pipe.

1.04 STANDARDS

The following publications, referred to hereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

ASTM D-48 “Standard Classification for Sizes of Aggregate for Road and Bridge Construction"
ASTM D-698 "Moisture-Density Relationship of Soils and Soil Aggregate Mixtures, Using 5.5 -Ib Rammer and 12 Inch Drop"
ASTM D-1556 "Density of Soil in Place by the Sand Cone Method"

ASTM D-2487 "Classification of Soils for Engineering Purposes"
ASTM D-2922 "Density of Soil and Soil - Aggregate In-Place by Nuclear Methods"
ASTM D-3017 "Moisture Content of Soil and Soil - Aggregate In-Place by Nuclear Methods"
ASTM D-4253 "Test Methods for Maximum Index Density of Soils Using a Vibratory Table"
ASTM D-4254 "Test Methods for Minimum Index Density of Soils and Calculations of Relative Density"

Any other testing required by these specifications and not specifically referenced to a standard shall be performed under ASTM or other appropriate standards as designated by the Engineer.

Reference herein or on the drawings to soil classifications shall be understood to be according to ASTM D-2487, "Classification of Soils for Engineering Purposes" unless indicated otherwise.

1.05 DELIVERY AND STORAGE

Excavated materials to be used for backfilling may be deposited in stockpiles at points convenient for re-handling the material during the backfilling process. The location of stockpiles shall be within the limits of construction easements or public right-of-way. The location of stockpiles is subject to the approval of the Owner or the Owner's representative. Keep drainage channels clear of stockpiled materials.

1.06 JOB CONDITIONS

Place no embedment or backfill material during freezing weather or upon frozen subgrades or previously placed frozen embedment or backfill materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. CONCRETE FOR BACKFILL, BLOCKING, CRADLING AND ENCASEMENT. Unless other strength requirements arc designated, concrete used shall be 4,000 psi as specified in Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. CLASS 1 EARTH FILL: Limited to clays and sandy clays classified as CH material with a liquid limit greater than or equal to 50, a plasticity index greater than or equal to 25, and a minimum of 60% passing the No. 200 sieve, which arc free of organic materials

C. CLASS 3 EARTH FILL- Consist of any materials classified as CH, CL, SM, SP, SP-SM, SC, and GC, which have a minimum plasticity index of 4, which are free of organic materials.

D. CLASS 12 EARTH FILL: Consist of soils suitable for topsoil which are relatively free of stones or other objectionable debris, which have sufficient humus content to readily support vegetative growth. The suitability of soils for topsoil shall be subject to the approval of the Engineer.

E. CLASS 2 AGGREGATE FILL: [For Reinforced Concrete or Concrete Cylinder Pipe] Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM Method C-13 1 or C-535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C-88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D-448, size number 67:

Sieve Size Square Opening	Percent Passing
1"	100
3/4"	90 - 100
3/8"	20 - 55
No. 4	0 - 10
No. 8	0 - 5

F. CLASS 3 AGGREGATE FILL: [For Iron, Cast Iron, or Corrugated Metal Pipe] Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and have a percentage of wear of not more than 40% when tested in accordance with ASTM C-131 or C-535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C-88, Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. The source of the material shall be approved by the Engineer and meet the following gradation in accordance with ASTM D-448, size number 7:

Sieve Size Square Opening	Percent Passing
3/4"	100
½"	90 - 100
3/8"	40 - 70
No. 4	0 - 15
No. 8	0 - 5

G. CLASS 10 AGGREGATE FILL: or Iron-reinforced Concrete, Vitrified Clay, PVC, Fiberglass, or Asbestos Cement Pipe] Consist of washed and screened natural sands or sands manufactured by crushing stones complying with the requirements and tests of "Standard Specifications for Concrete Aggregates", ASTM C-33. The gradation as included in ASTM C-33 is as follows:

Sieve Size Square Opening	Percent Passing
8"	00
No. 4	95 - 100
No .8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	10-30
No. 100	2-10

Class 10 Aggregate Fill shall have not more than 45°/O passing any sieve and retained on the next consecutive sieve of those shown above, and its fineness modulus, as defined in ASTM C-125, shall be not less than 2.3 nor more than 3.1.

H. CEMENT: Type I Portland Cement

2.02 MIXES; SAND-CEMENT BACKFILL [OR EMBEDMENT]

A. A minimum sand and cement mixture of 27 parts sand and 2 parts cement will be required.

Fine Sand	1 Cubic Yard
Cement	1 Bag (Minimum)
Water	Optimum Moisture

B. Sand shall be free of any cohesive material and shall meet the following gradation and plasticity index requirements:

Sieve Size	Percent Passing
1"	100
½"	95 - 100
No. 40	80 - 100
Plasticity Index	10 Maximum
Liquid Limit	25 or less

2.03 FABRICATIONS [Not Used]

2.04 MANUFACTURED PRODUCTS [Not Used]

PART 3 - EXECUTION

3.01 PREPARATION

A. SITE

1. Clear sites of logs, trees, roots, brush, tree trimmings and other objectionable materials and debris which are to be occupied by pipe trenches, and grub stumps. Designate material not salvaged for reuse as surface material as spoiled and dispose of material in accordance with Paragraph E - DISPOSAL OF SPOIL MATERIAL, of this section.
2. Do not remove trees outside of the required working area unless their removal is authorized in writing by the Engineer and with the approval of the local governing authority. Adequately protect the trees left standing from permanent damage by construction operations. Standing trees may be trimmed where necessary to facilitate construction, but only with written authorization from the Engineer.

B. DEWATERING

1. Provide and maintain adequate dewatering equipment to remove and dispose of surface and ground water entering the excavations, trenches, or other parts of the work. Keep each excavation dry during subgrade preparation and continually thereafter until the proposed pipe is installed. Maintain the proper procedures necessary to protect against damage to the proposed work from hydrostatic pressure, flotation, or other water related causes.
2. Dewater excavations which extend down to or below ground water elevation by lowering and keeping the ground water level a minimum of 2-feet below the bottom of the excavation.
3. Divert surface water or otherwise prevent water from entering excavated areas to the fullest extent possible without causing damage to adjacent property.
4. Provide and maintain any piping or conduit necessary to facilitate drainage. Do not alter area drainage patterns to the extent that adjacent property and landowners become threatened with localized flooding and/or water damage. Should such a situation occur, the Contractor shall be responsible for repairing the damage at no additional cost to the Owner.

C. PROTECTION OF EXISTING STRUCTURES AND UTILITIES

1. Prior to the start of construction, communicate with the local representatives of utilities companies, including but limited to oil, gas, telephone, and communications companies, as well as local water and sewer utilities operating in the location of the proposed construction area. Seek the utility companies' assistance in locating existing facilities to avoid conflicts during construction. The

location, number, depth, and owner of utilities indicated are for information purposes only, and all utilities and structures may not be shown or may not be in the location shown.

2. Where construction endangers adjacent structures, utilities, embankments and/or roadways, the Contractor shall, at his own expense, carefully support and protect such structures so that no damage occurs throughout the construction process. In case damage should occur, the Contractor shall be responsible for restoring the damaged structure to a condition acceptable to the Owner of that structure and shall bear all cost of such reparations.
3. Repair or replace damaged street surfaces, driveways, sidewalks, curbs, gutters, fences, drainage structures, or other such facilities to the satisfaction of the Owner. Structures shall be returned to a condition equal to or better than the original condition and of same or better material and quality.

D. BLASTING

Blasting shall not be allowed in any instance.

E. DISPOSAL OF SPOIL MATERIAL

1. Suitable material from excavations which meets the requirements for pipe backfill material as indicated, except stripping excavation, may be reused. Designate the remaining excavated materials as spoiled material and dispose of material off the site in accordance with all applicable laws, ordinances, and codes. Contractor shall be responsible for the storage, transportation, and deposition of spoiled material and shall be responsible for acquiring the necessary permits, and the payment of fees and duties at no additional cost to the Owner.
2. No burning of materials shall be permitted on the site.

3.02 TRENCH EXCAVATION

A. GENERAL

The trenches shall be excavated to the alignment and depth indicated or as necessary for the proper installation of the pipe and appurtenances. Brace and dewater the trench if necessary, so that the workmen may work therein safely and efficiently. Any specific requirement listed in Part 3 - EXECUTION may be modified as necessary to meet OSHA requirements. However, if trench widths are wider than indicated, the Contractor shall be responsible for determining the proper class of embedment and piping and the installation.

B. TRENCH WIDTH

The trench widths shall be as shown on the drawings.

C. PIPE FOUNDATION SUBGRADE

1. Excavate the trench to an even grade to permit the installation of the pipe so that the full length of the pipe barrel is supported on the proper depth of bedding material. The entire foundation subgrade area in the bottom of the excavations shall be firm, stable material, and the material shall not be disturbed below required grade except as described in this specification. Where the character of the subgrade material is such that proper subgrade cannot be obtained at the elevation indicated, deepen the excavation to a satisfactory subgrade material.
2. Remove the material until a firm, stable, and uniform bearing is reached, and the subgrade brought back to the required grade with the specified bedding material

compacted in place or with lean concrete material. The expense of replacing any unsatisfactory subgrade shall be borne by the Contractor.

D. CORRECTING FAULTY GRADE

Should any part of the trench be excavated below required grade, correct the trench with bedding material, thoroughly compacted, or with lean concrete, at no additional compensation to the Contractor.

E. CARE OF SURFACE MATERIAL FOR REUSE

If local conditions permit reuse, keep surface material suitable for reuse separate from the general excavation material.

F. TRENCHING METHODS

The use of any suitable trench digging machinery is permitted except in places where such operations may cause damage, above or below ground, in which case, employ hand methods.

G. PIPE CLEARANCE IN ROCK

Remove ledge rock, rock fragments, shale, or other rock to provide proper clearance for bedding materials. Provide adequate clearance for properly jointing pipe laid in rock trenches at bell holes.

3.03 BACKFILL

A. BEDDING WITHING PIPE ZONE

1. CONCRETE CRADLE, ENCASEMENT OR CONCRETE ARCH
   Where indicated, install in the pipe in concrete cradle, encasement, or concrete arch. Take precautions to prevent pipe movement or deflection during construction. Where pipes are placed below structures, completely encase pipes in 1,500 psi concrete, and extend up to bottom of structure.
2. CONCRETE BLOCKING
   Place blocking to rest against firm undisturbed trench walls. The supporting area for each block shall be at least as great as that indicated and shall be sufficient to withstand the thrust, including water hammer, which may develop. Each block shall rest on a firm undisturbed foundation of trench sides and bottom.

B. AGGREGATE FILL BEDDING

1. After the trench has been cut to the depths indicated, bring up the bedding layer to a point slightly above grade in maximum 4" lifts and uniformly compact to the density indicated. Form bell holes and scoop out a trough to grade so that the pipe is uniformly supported by the embedment material. Lay and joint the pipe. Bring up the embedment material in maximum 4" lifts on either side of the pipe to the elevation above the pipe shown on the plans. Uniformly compact the pipe as indicated.
2. After moisture is gone from the embedment material, place and compact the remaining backfill by tampering or other appropriate methods. Water jetting shall not be permitted.

C. COMPACTION REQUIREMENTS

1. Compact earth fill an adhesive aggregate fill in maximum 4" lifts with pneumatic rollers or power hand tampers and make a minimum of eight (8) passes.
2. Compact cohesionless aggregate fill in maximum 4" lifts with vibratory rollers or vibratory plate power hand compactors and make a minimum of eight (8) passes.
3. The acceptability of the compaction equipment shall be based upon the results of a test section.
4. Compact earth fill and cohesive aggregate fill to a minimum of 95% of maximum dry density as determined by ASTM D-698, Standard Proctor.
5. Compact earth fill Class 1 and 2 at a moisture content within minus 0 to plus 5 percentage points of the optimum moisture content. Compact the remaining classes of earth fill and cohesive aggregate fill at a moisture content within minus 2 to plus 5 percentage points of optimum moisture content. The moisture ranges listed above are minimum and maximum limits. A tighter moisture range within these limits may be required to consistently achieve the specified density.
6. Compact cohesionless aggregate fill on which it is not practical to control the density by “Proctor” methods to a minimum of 75% of relative density as determined by ASTM D-4253 and D-4254, or at the discretion of the Engineer, by a field compaction mold method correlated to ASTM D-4253 and D-4254.
7. Compact cohesionless aggregate fill at moisture content within a range that accommodates consistent placement and compaction to the minimum relative density specified above.
8. The Owner will arrange and pay for density and moisture testing. The testing frequency and methods shall be as requested by the Engineer. The Engineer may waive testing requirements on cohesionless bedding where testing is not practical because of limited space between the pipe and trench walls, however, the minimum number of passes of the compaction equipment specified above shall be achieved.

3.04 FINISHING

A. Grade and rake areas smooth and even which do not receive any type of paved surface, to allow drainage to drain away from the structures and toward the roads and streets or the natural drainage course. Break up large clods of earth and remove rocks, trash, and debris near the surface.

B. Finish the top portion of backfill beneath established sodded (lawn) areas with not less than 6" of topsoil corresponding to, or better than, that underlying adjoining sodded areas.

3.05 FIELD QUALITY CONTROL

A. Compact backfill and appropriate embedment material to a minimum of 95% of maximum density at a moisture content of 0 to + 5% of optimum for backfill and at optimum for sand-cement embedment as determined by ASTM D-698-78 (Standard Proctor),

B. Make periodic tests of compaction for conformance with this section by an approved testing laboratory selected and paid for by the Owner. Contractor shall pay for re-testing until acceptable test results are obtained.

3.06 CLEAN AND ADJUST

Remove surplus pipeline materials, tools, rubbish, and temporary structures and leave the construction site clean, to the satisfaction of the Engineer.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.01 WORK INCLUDED

Provide labor, materials, equipment, and incidentals necessary to seed the slopes and other areas as specified. This specification includes seedbed fertilization, watering, mulching, and emulsifying or tacking the mulch and maintenance until final acceptance by the Owner.

1.02 STANDARDS

The seed used on this project will conform to ITEM 164.2 Standard Specifications for Construction of Highways, Streets and Bridges, Texas Department of Transportation.

1.03 DELIVERY AND STORAGE

Deliver seed with each variety separately bagged.

1.04 OPTIONS

A. If dry mechanical methods are used, the fertilizer may be spread at the same time as the seed. After sowing, straw mulch will be mechanically spread over the seeded area.

B. When seed and fertilizer are to be distributed as a water slurry, apply the mixture within thirty (30) minutes of mixing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. SEED: From the previous season's crop, labeled in accordance with the Texas Seed Law.

1. Seed for Fall planting (temporary) shall be one (1) or more of the following small grains as designated by the Engineer: Wheat, oats, cereal rye, or barley.
2. Seed for Spring planting (permanent) shall be Bermuda grass.

B. FERTILIZER

A uniform application of 10-6-4 (nitrogen-phosphorus-potassium) fertilizer at a rate of 18 pounds per 1,000 square feet (800 pounds per acre).

C. MULCH

1. Consisting of straw, wood-fiber, mulch nettings, wood chips or other suitable material approved by the Engineer and free of Johnson grass and other noxious weed seeds.
2. Straw mulch shall be oat, wheat or rice straw, prairie hay, Bermuda grass hay, or

other hay harvested before seed production and approved by the Engineer. The straw mulch will be kept dry and shall not be rotted or molded. A minimum of 50% by weight of the herbage making up the hay shall be l0" in length or longer.

D. TOPSOIL: As specified for Class 12 Earth Fill in Section 31 05 13, SOILS FOR EARTHWORK.

E. HERBICIDE: Contractor shall be responsible for using herbicides in a manner consistent with label requirements and precautions. Only registered herbicides having a minimal residual effect shall be used. Contractor shall strictly adhere to all Federal, State, and local laws governing herbicide usage.

PART 3 - EXECUTION

3.01 PREPARATION [Not Used]

3.02 TOPSOIL PLACEMENT

Place topsoil as specified for Class 12 Earth Fill.

3.03 FALL PLANTING

Fall planting will be temporary only and will be required if construction is completed between September 15 and April 15. The Fall planting is to be followed by a Spring planting of perennial vegetation.

A. SEEDBED PREPARATION

Use a one-way plow, tandem disk, bedder, or equipment which will accomplish similar results. Break or mix the surface of the soil with the tillage equipment. Additional tillage operations will be necessary if required so planting can be on a clean, firm seedbed. Chiseling will be necessary on areas which have been severely compacted.

B. SEEDING

1. Seeding will be required on disturbed or excavated areas and on new embankments of whatever nature unless requested otherwise by the Engineer.

2. Optimum Fall planting dates are September 1 to November 30. Accomplish the seeding for Fall planting within these dates unless approval to do otherwise is obtained from the Engineer. Planting rates when drilled or broadcast are as follows:

Wheat	120	lbs/acre
Oats	128	lbs/acre
Rye	200	lbs/acre
Barley	114	lbs/acre

3.04 SPRING PLANTING

Follow procedures for Spring planting if construction is completed between April 15 and September 15, or after a temporary Fall planting has been made.

A. SEEDBED PREPARATION

Seedbed preparation for Spring planting is the same as that stated in the Fall planting of temporary cover with one addition. Any temporary cover crop must be top killed using an approved contact herbicide or by mechanically undercutting the growing cover crop, leaving residues on or near the soil surface.

B. MULCHING

1. Spread mulch material on the area to be planted if construction was completed too late for planting a temporary fall crop or if insufficient residues are produced by the Fall planting. Mulch the planting areas to control soil erosion and seed loss by wind and water and to promote grass establishment. Apply Mulch hay at the rate of 2 tons per acre and spread uniformly so that about 25% of the ground surface is uniformly visible through the mulch.
2. Anchor the mulch hay by treading into the soil with a straight disk type mulch tiller. Perform disking across the slope along contours. Other types of mulch such as wood cellulose fiber or cotton bur mulch may be used at recommended rates, if approved by the Engineer. Apply mulch in a manner that will not hinder emergence of seedlings.

C. SEEDING

1. Plant Bermuda grass seed between April 15 and Sept. 15. Sow the seed at the rate of 10 pounds of pure live seed (PLS) per 1,000 SF, or more if required to obtain a complete stand of grass. The PLS content is determined by multiplying the seed package weight by the product of the percent purity, and the percent germination, which are contained on the seed label.
2. Accomplish seeding by mechanical means using either broadcasting or drilling type equipment to provide uniform distribution of the seed in the planting areas. Cover Bermuda grass seed with1/4 to 1/2" of approved topsoil. If seed is drilled, the distance between drill rows shall not exceed 12". Hydro-seeding may be used to apply seed, fertilizer, and wood-fiber mulch with the approval of the Engineer.

3.05 MAINTENANCE

A. IRRIGATION

Supply the seeded areas with adequate moisture (4" penetration) at ten (10) day intervals, if needed, for seed germination and plant growth until acceptance by the Owner. Water the seed in a manner which will prevent erosion of the soil. Furnish all water to be used.

B. REPAIR

Repair washouts and other bare soil areas in a seeded area either by re-seeding, sprigging, or spot-sodding, and perform maintenance as needed to establish grass in the area.

C. WEED CONTROL

1. Control competitive weed growth during the establishment period by mowing and/or with herbicides. Chemical usage shall be in accordance with the current recommendations of the Texas Agricultural Experiment Station or local Soil

Conservation Service Field Office Technical Guides. Strictly adhere to all Federal, State, and local laws governing herbicides.

2. Weed control shall be the Contractor's responsibility whether topsoil is from on-site or off-site sources and also for seeded areas which are specified not to receive topsoil.

3.06 SEEDING OF DISTURBED AREAS

A. Disturbed areas will require seeding as specified in this section unless requested otherwise by the Engineer or shown otherwise on the drawings or in the specifications.

B. Any areas which are disturbed by the Contractor which are not shown on the drawings or specified to require disturbance including any approved areas not shown on the drawings, shall be considered as unauthorized disturbed areas. Any such areas shall be seeded as specified in this section at the Contractor's expense and shall not be measured or paid under this section.

3.07 FIELD QUALITY CONTROL; OBSERVATION AND ACCEPTANCE

A. OBSERVATION

Upon completion of the site preparation, mulching, fertilizing, seeding, and maintenance of seeded areas, the Engineer will observe the seeded areas periodically to determine the establishment success. The Engineer will consider soil coverage, purity of the grass stand, and maturity of the plants.

B. ESTABLISHMENT OF STAND AND ACCEPTANCE

The Engineer will determine that a grassed area is established upon fulfillment of the following conditions:

1. The permanent grass stand uniformly covers the planting area, with no exposed soil areas more than 6" across in any dimension.
2. The permanent grass stand is free of over-topping weed species which would compete for sunlight, moisture, and nutrients. In addition, no area of pure weed species greater than 6" across in any dimension shall occur within a permanent grass stand.
3. The majority of the grass plants in a stand shall have a well-established root system to survive if irrigation is discontinued. Establish the permanent grass stand before September 15 to preclude having to perform a temporary Fall seeding. In the event a Fall seeding must be performed, follow-up the temporary seeding with a permanent seeding as specified. Upon final acceptance of the work under this contract, the Owner will assume the responsibility of maintaining the grassed areas.

END OF SECTION

SECTION 31 41 33

TRENCH SHIELDING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This specification consists of the basic requirements which the Contractor must comply with in order to provide for the safety and health of workers in a trench. This specification is for the purpose of providing minimum performance specifications, and the Contractor shall develop, design, and implement the trench safety system. The Contractor shall bear the sole responsibility for the adequacy of the trench safety system and providing "a safe place to work" for the workman.

B. Should the trench safety protection system require wider trenches than specified elsewhere, the Contractor shall be responsible for the costs associated with determining adequacy of pipe bedding and class, as well as purchase and installation of alternate materials.

1.02 STANDARDS

A. The following standard shall be the minimum governing requirement of this specification and is hereby made a part of this specification as if written in its entirety.

Occupational Safety and Health Standards - Excavations (29CFR Part 1926), U.S. Department of Labor, latest edition.

B. Comply with the applicable Federal, State, and local rules, regulations, and ordinances.

END OF SECTION

SECTION 31 63 29

DRILLED PIERS

PART 1 - GENERAL

1.01 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 41 00.
   2. Soil Investigation Data: Section 02 20 00.
   3. Concrete Reinforcement: Section 03 20 00.
   4. Cast-in-Place Concrete: Section 03 30 00.

1.02 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 41 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.

1.03 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

2.01 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.

2.02 MATERIALS

A. Concrete Reinforcement: As specified in Section 03 20 00.

B. Cement, Aggregates and Admixtures: As specified in Section 03 30 00.

2.03 MIXES

A. As specified in Section 03 30 00.

PART 3 – EXECUTION

3.01 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.

3.02 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.

3.03 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 31 00

DECORATIVE METAL FENCES AND GATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Ornamental rackable aluminum fence system (A2 Commercial)

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 31 10 00 - Site Clearing.

1.3 REFERENCES

A. American Society for Testing and Materials International (ASTM).
1. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
3. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
5. ASTM D523 - Standard Test Method for Specular Gloss.
6. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints.
7. ASTM D822 - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
8. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
9. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
10. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
11. ASTM D3359 - Standard Test Methods for Measuring Adhesion by Tape Test.
12. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
13. ASTM F1908 - Standard Guide for Fences for Residential Outdoor Swimming Pools, Hot Tubs, and Spas.
14. ASTM F2049 - Standard Safety Performance Specification for Fences/Barriers for Public, Commercial, and Multi-Family Residential Use Outdoor Play Areas.
15. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets.
16. ASTM F2957 - Standard Specification for Ornamental Aluminum Fence Systems.

B. American Welding Society (AWS): AWS D1.1 - Structural Welding Code - Steel

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Manufacturer's printed product information indicating material compliance and specified options are to be submitted prior to installation. Submit manufacturer's product data sheets on each product to be used.

C. Shop drawings shall include plans, elevations, sections, details, and attachments to other work. Drawings must be submitted for approval and be approved prior to installation.

D. Design data which verifies compliance with design loads specified in Performance Requirements Article. Design data shall be signed and sealed by the qualified professional engineer responsible for their preparation.

E. Submit samples for initial color selection. Submit samples of each specified finish.

1.5 QUALITY ASSURANCE

A. Manufacturing company with engineering and fabrication of custom fencing and gate systems for a minimum of 15 years.

B. Installation company with experienced in manufacturer's products for a minimum of 5 years. The Contractor shall provide trained laborers with prior experience in the type of construction involved as well as experience installing the materials and techniques specified.

C. Obtain each fence system and gates through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Upon delivery to the jobsite, inspect all materials for damage that might have occurred during shipment.

B. Handle and store materials in manufacturer's packaging until materials are ready to be installed. Store materials in such a way as to prevent damage and theft.

1.7 PROJECT CONDITIONS

A. Verify actual locations of walls and other construction contiguous with fencing and gates by field measurements before fabrication and indicate measurements on shop drawings. Provide allowance for trimming and fitting onsite.

1.8 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for fencing and gates. 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 the Project Site in time for installation.

B. Schedule installation so wall attachments are made only to completed walls. Do not support systems temporarily by any means that do not satisfy structural performance requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Fortress Fence Products, which is located at: 1720 N. First St.; Garland, TX 75040; Toll Free Tel: 866-323-4766; Email: request info (Specifications@fortressbp.com); Web: http://www.fortressfence.com

B. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 SITE FENCING AND GATES

A. Ornamental Rackable Aluminum Fence Systems:
   1. Basis of Design: A2 Commercial Aluminum Fencing System as manufactured by Fortress Fence Products, a division of The Fortress Company. Hidden picket to rail fastener system offering high quality aesthetics. Notched Rail andf Pre- Punched Post design.
   2. Standards Compliance: ASTM F2957 for commercial applications. Meets or exceeds.
   3. Available Racking: 28 inch (710 mm), vertical.
   4. Rails: 1-1/2 inches (38 mm).
   5. Pickets: 3/4 inches (19 mm).
   6. Gate Uprights: 2 inches (51 mm).
   7. Air Spaces: 3-3/4 inches (95 mm).
   8. Panel Styles:
      a. Configuration: 4 rail.
      b. Style: Flat Top, Flat Bottom (FT/FB).
   9. Panel Dimensions:
      a. Width: As indicated on the Drawings.
      b. Height: 72 inches (1829 mm).
   10. Gate Styles: Walk Gates, Flat/ 48 inches (1219 mm).
   11. Posts and Accessories:
      a. Posts, End, Line, Corner, Gate: 3 inch square
      b. Cap: Pressed dome.
      c. Wall mount bracket.
      d. Post base and adapter cover.
      e. Swivel bracket.
      f. Gate latch and Hinge kit
   12. Finish: Powder coating. Architectural grade.
      a. Color: Gloss Black
   13. Fastening Connections:
      a. Rail to Post: Slip fit into routings and then secured to the post with one No. 12-14 (0.162 inch minor diameter) by 2-1/2 inch (64 mm) long, hex-washer head, galvanized steel, self-drilling screw
      b. Picket to Picket Retainer: One blind pop rivet to each retainer.
      c. Picket Retainers to Rail: Snap fit into rail - no mechanical connections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake layout showing locations of gates and posts per submitted shop drawings.
   1. Contact "CALL BEFORE YOU DIG" prior to beginning any excavation work

B. Contact applicable authorities and take necessary precautions prior to beginning any excavation work.

3.3 INSTALLATION

A. Install fences in accordance with manufacturer's written instructions and in accordance with authorities having jurisdiction. Installation shall conform to the specifications referenced elsewhere in this Section and as indicated on the Drawings.

B. Concrete Set Posts: Drill hole in firm soil. Posts holes will be a minimum of 36 inches (mm) deep (environmental conditions or local codes may require a greater depth). Fence post shall be spaced 95 inches (mm) plus or minus 1/4 inch (6 mm) on-center to accommodate installation of brackets on 2-1/2 inch (64 mm) square post. For non-level installations, the on-center post spacing must be measured along the grade.

C. Refer to Division 3 for concrete specification. Recommend minimum 28 day compressive strength of 3,000 psi (20 MPa). Crown concrete at top to shed water.

D. On-center post spacing per manufacturer's drawings.

E. Install brackets onto fence section and posts as indicated in manufacturer's printed instructions for specific fence style. Attach fence sections to brackets with approved fasteners and techniques to ensure that fence sections are parallel to grade within 1/4" in 12 feet.

F. Install gate in accordance with manufacturer's printed instructions and approved signoff drawings. Do not mount gate from wall of a structure. Provide gate post on both sides of a gate. For double drive gate installation, provide concrete center drop to foundation depth and drop rod retainers at center. Lubricate to ensure smooth operation and verify proper latch operation.

3.4 CLEANING

A. Remove cutting and drilling chips that are attached to the fencing, post, brackets, or additions to prevent corrosion.

B. Repair scratches and other installation-incurred damage. Using a spray paint of the appropriate color that includes a zinc additive, repaint and seal any scratches or holes drilled in the fencing, post, brackets, or additions to prevent rust from forming. Clean up debris and unused material and remove from site.

C. Clean up debris and unused material, and remove from site.

3.5 PROTECTION

A. Protect finishes from damage during construction period with temporary protective coverings approved by manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 323119
DECORATIVE METAL FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Decorative steel fences.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 31 2316 - Excavation.

1.03 REFERENCE STANDARDS

A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

C. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) 1993 (Reapproved 2019).

D. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test 2023.

E. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets 2016 (Reapproved 2023).

F. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing 2018.

G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to start of work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit 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. Design Calculations: For high wind load areas, provide calculations for fence panels and accessory selection as well as line post spacing and foundation details. See CLFMI WLG 2445 for line post and spacing guidance.

D. Shop Drawings:
   1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
   2. Foundation details, concrete design mix and reinforcing schedule for anti-ram barrier system.

E. Samples: Submit two samples of fence panels, 18 inch by 24 inch in size illustrating construction and colored finish.

F. Manufacturer's Warranty.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

1.07 DELIVERY, STORAGE AND HANDLING

A. Store materials in a manner to ensure proper ventilation and drainage. Protect against damage, weather, vandalism and theft.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Decorative Metal Fences and Gates:
1. Ameristar Perimeter Security, USA; www.ameristarperimeter.com.
2. CDH Custom Roll Form, LLC; Palisade Security Fence: www.cdhrollform.com.
3. Knotwood, a brand of OmniMax International; www.knotwood.com.
4. Patriot Custom Metals DBA PalmSHIELD; www.palmshieldlouvers.com.
5. Stewart Iron Works, LLC; www.stewartironworks.com.
6. Substitutions: See Section 016000 - Product Requirements.

2.02 FENCES

A. Fences: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electrodeposition coating, and having the following performance characteristics:
1. Capable of resisting vertical load, horizontal load and infill performance requirements for fence categories defined in ASTM F2408.

B. Electro-Deposition Coating: Multistage pretreatment/wash with zinc phosphate, followed by epoxy primer and acrylic topcoat.
1. Total Coating Thickness: 2 mils, minimum.
2. Color: As selected by Architect from manufacturer's standard range.
3. Coating Performance: Comply with general requirements of ASTM F2408.
a. Adhesion: ASTM D3359 (Method B); Class 3B with 90 percent or more of coating remaining in tested area.
b. Impact Resistance: ASTM D2794; 60 inch pounds (6.8 N m).

C. Steel: ASTM A653/A653M; tensile strength 45,000 psi (310 MPa), minimum.
1. Hot-dip galvanized; ASTM A653/A653M, G60.
2. 62 percent recycled steel, minimum.

D. Fasteners: ASTM A276/A276M, Type 302 stainless steel; finished to match fence components.

E. Hinges: Finished to match fence components.

F. Latches: Finished to match fence components.

2.03 WELDED STEEL FENCE

A. Provide fence meeting requirements for Industrial class as defined by ASTM F2408.

B. Fence Panels: Fusion welded; 8 feet high by 8 feet long.
1. Panel Style: Three rail.
2. Attach panels to posts with manufacturer's standard panel brackets.

C. Posts: Steel tube.
1. Size: 2-1/2 inches square by 12 gauge, 0.109 inch, with manufacturer's standard cap.

D. Rails: Manufacturer's standard, double-wall steel channel 1-3/4 inch square by 12 gauge, 0.1094 inch with prepunched picket holes.
   1. Picket Retaining Rods: 0.125 inch (3.17 mm) galvanized steel.
   2. Picket-to-Rail Intersection Seals: PVC grommets.

E. Pickets: Steel tube.
   1. Spacing: 3-3/4 inch clear.
   2. Size: 1 inch square by 18 gauge, 0.0478 inch.
   3. Style: Pickets with finial extend above top rail.
   4. Finial: Spear point.

F. Flexibility: Capable of following variable slope of up to 1:2.

G. Color: Black.

2.04 ACCESSORIES

A. Keypad Mounting Supports: Where not factory installed, provide mounting supports for keypad installation.

B. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

C. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set fence posts in accordance with the manufacturer recommended spacing.

C. When cutting rails immediately seal the exposed surfaces by:
   1. Removing metal shavings from cut area.
   2. Apply zinc-rich primer to thoroughly cover cut edge and drilled hole; allow to dry.
   3. Apply two coats of custom finish spray paint matching fence color.
   4. Failure to seal exposed surfaces in accordance with manufacturer's instructions will negate manufacturer's warranty.

D. Space gate posts according to the manufacturers' drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected.
   1. Base type and quantity of gate hinges on the application, weight, height, and number of gate cycles.

E. Excavate post holes in accordance with Section 312316.

F. Install operator in accordance with manufacturer's instructions and in accordance with NFPA 70.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6.3 mm).

B. Maximum Offset From Indicated Position: 1 inch (25.4 mm).

C. Minimum Distance from Property Line: 6 inches (152 mm).

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Post Settings: Randomly inspect three locations against design for:
   1. Hole diameter.
   2. Hole depth.
   3. Hole spacing.

C. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.

D. Gates: Inspect for level, plumb, and alignment.

E. Workmanship: Verify neat installation free of defects.

3.06 CLEANING

A. Leave immediate work area neat at end of work day.

B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

C. Clean fence with mild household detergent and clean water rinse well.

D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

F. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, and maintenance of each component.

3.08 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

SECTION 32 84 00

PLANTING IRRIGATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Piping.

B. Manual valves.

C. Pressure-reducing valves.

D. Automatic control valves.

E. Automatic drain valves.

F. Transition fittings.

G. Miscellaneous piping specialties.

H. Sprinklers.

I. Quick couplers.

J. Drip irrigation specialties.

K. Controllers.

L. Boxes for automatic control valves.

1.02 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.03 PERFORMANCE REQUIREMENTS

A, Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

C. Minimum Working Pressures: Reference drawing notes.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. The following items shall be included in submittal but not limited to:

1. Pipe
2. Controller
3. Electric control valves
4. Freeze sensor
5. Moister sensor
6. Spray nozzles
7. Pop ups heads
8. Rotary heads
9. Gate valves

10. Backflow preventer
11. Wire
12. Flow sensor and master valve

B. Qualification Data: For qualified Installer.

C. Operation and Maintenance Data: For controllers and automatic control valves to include in operation and maintenance manuals.

1. The O&M Manual shall include manufacturer's recommended instructions and maintenance schedule for the complete irrigation system.
2. Provide a copy of the color-coded Controller Chart in the Manual

D. As – Built Drawings

13. Record drawing noting any variations from the Contract Documents. Submit one copy of record " As – Built" prints prior to expiration of the required maintenance period
14. All valves and controller shall be GPS surveyed.
15. All valves shall be numbered with a metal tag and reference to the "As – Built Drawing".

E. Controller Chart: Provide a Controller Chart that is 8 ½ " x 11" and thematically sealed. Chart shall be legible and color – coded for each zone, keying stations of the Controller to valve locations and to irrigation heads served by the station. Place Chart inside door of Controller.

F. Spray irrigation system audit test results. Turf areas 10,000 sf and larger shall be audited by an Irrigation Association certified auditor. The following efficiencies shall be minimal: Fixed spray – 60%, rotors – 70%.

G. Backflow test results.

H. Pressure test results of system pressure test for 1 hour at 100 psi.

I. Installer Qualifications: Licensed in landscaping and irrigation systems with not less than five years experience in the type and scale of work required in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Licensed in landscaping and irrigation systems with not less than five years experience in the type and scale of work required in this Section.

B. All irrigation work shall be performed by a single firm specializing in this type of work and possessing the State of Texas Irrigation license. Contractor shall also provide for at least one on-site employee with an irrigation license.

C. Irrigation System: Provide underground irrigation system as a complete unit, including sprinklers, bubblers, drip irrigation heads, controllers, and accessories – produced by acceptable manufacturers as specified herein.

D. 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.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.07 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Construction Manager and Owner no fewer than five 5 days in advance of proposed interruption of water service.

2. Do not proceed with interruption of water service without Construction Manager's written permission.

J. Existing Conditions:

1. Take precaution to insure that equipment and vehicles do not disturb or damage existing site grading, walks, curbs, pavements, utilities, plants, tree protection zones, and other existing items and elements of the Site. Notify the Owner if rock layer(s) or other unanticipated conditions are encountered underground.
2. Utilities: Verify the locations and sizes of stub-outs for water sources indicated on the Contract Drawings as the source of water supply to the underground irrigation system.
3. Existing Utilities: Prior to excavation, determine the locations of all newly constructed and existing utilities. It is the Contractor's responsibility to obtain all necessary spotting services thru the Owner. Do not damage or disturb underground utilities. If a conflict exists between the location of underground utilities and the proposed work, notify the Owner and arrange for field and design adjustments.
4. Unknown Utilities: In the event that uncharted or incorrectly charted utilities are encountered during excavation that conflicts with this work, all work on that part of the job shall cease until the Owner is contacted and resumption of work is authorized by the Owner.
5. Existing Structures: Use extreme caution when working near existing structures. Do not damage existing features unless specifically indicated on the Contract Drawings. Contractor is responsible for incidental damage caused to existing site features and structures. Repairs shall be made at Contractor's expense.
6. Sequencing/Scheduling: Coordinate irrigation system with related work. Grade site within 1"-inch of finish grade prior to trenching. Install irrigation system prior to plant material installation.

1.08 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Spray Sprinklers: Equal to 1 percent of amount installed for each type and size indicated, but no fewer than 2 units.
2. Bubblers: Equal to 2 percent of amount installed for each type indicated, but no fewer than 2 units.
3. Emitters: Equal to 5 percent of amount installed for each type indicated, but no fewer than 5 units.
4. Drip-Tube System Tubing: Equal to 5 percent of total length installed for each type and size indicated, but not less than 100 feet

1.09 WARRANTY

A. General: Warranty underground irrigation system through the specified warranty period of one twelve month calendar period against operational deficiencies due to inferior material or workmanship. Correct deficiencies immediately as directed by the Owner at no additional cost to owner, including damage caused by such defects. Repairs shall be completed within ten business days of notification from the Owner.

B. Settlement: Warranty underground irrigation system through the specified warranty period of one twelve month calendar period against settlement damage. Adjust, restore, or replace pipes, valves, sprinkler heads, planting, paving, or other improvements or damages caused by settlement at no additional cost to the owner. These adjustments and restorations include damage caused to adjacent areas that are not part of the project. Damaged areas shall be restored to their original state.

PART 2 - PRODUCTS

2.01 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. PE Pipe with Controlled ID: ASTM F 771, PE 3408 compound; SIDR 11.5and SIDR 15.

1. Insert Fittings for PE Pipe: ASTM D 2609, nylon or propylene plastic with barbed ends. Include bands or other fasteners.

C. PE Pipe with Controlled OD: ASTM F 771, PE 3408 compound, SDR 11.

1. PE Butt, Heat-Fusion Fittings: ASTM D 3261.
2. PE Socket-Type Fittings: ASTM D 2683.

D. Pipe and Pipe Fittings

1. Polyvinyl Chloride Pipe (PVC).

a. Main and Lateral Lines: All plastic pipe which is 2-1/2 inches or smaller shall be Schedule 40 PVC and shall conform to ASTM D1785 – continuously and permanently marked with manufacturer's identification, type, class, nominal pipe size, schedule, and pressure rating [in psi] in accordance with the NSF standard.

b. Main Lines: All main line pipe which is larger than 2-1/2 inches in diameter shall be PVC 1120 or 1220 (SDR-PR) pipe, SDR-21 with a 200 psi pressure rating and conforming to ASTM D3139.

c. Provide pipes in 20 foot lengths, free of holes, blisters, wrinkles or dents. Note: Except for drip irrigation systems all systems are designed to 100 psi. Pressure shall be regulated at source connection to operate at manufacturers recommended pressure.

E. Threaded Nipples: Schedule 80 machined PVC pipe, Type 1, Cell Classification 12454, complying with ASTM D2467.

F. Line location tape: shall be detectable irrigation line marking tape- Thorbrand or equal. Location tape shall be used on all main and lateral lines.

2.02 PIPING JOINING MATERIALS

A. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

B. Cleaner, Primer and Solvent Cements

1. Cleaner: Uni-Weld 7300 cleaner, ASTM F 656, or approved equal. Cleaner shall be NSF approved.
2. Primer: Uni-Weld 8700, Hi-Etch purple primer, ASTM F656.
3. Cleaner/Primer shall be any color other than clear.
4. Solvent Cements: Uni-Weld 2200 clear, light viscosity type, for lateral lines, Uni-Weld 1700 gray, heavy duty viscosity type, for lateral lines larger than 2-1/2 inch diameter, and Uni-Weld 6700 clear, light viscosity type for Flex/PVC connections – ASTM D 2564. Solvent shall be NSF approved.

C. Sealing Tapes and Pastes:

1. 1. Threaded Connections between PVC and Metal Pipe: Rectorseal No. 100 virgin heavy duty sealing paste, Plasto-joint Stick as manufactured by Lake Chemical Company, or Teflon tape.
2. Metal-to-Metal Connection: Rectorseal No.5 slow dry, soft set pipe thread compound.
3. PVC-to-PVC Connections: Teflon tape.
4. Plastic irrigation head or Plastic valve to pipe Connections: Teflon tape. Thread sealing compound shall not be used on thread connections between nipples and plastic valves.

2.03 BACKFLOW PREVENTION DEVICES

A. Provided on existing system

B. Backflow Preventer shall be certified by licensed certified backflow preventer tester.

C. FEBCO or WATTS Regulator Co.

2.04 QUICK COUPLERS

A. Manufacturers: Subject to compliance with requirements, Provide products by one of the following :

B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

1. Rainbird.

C. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, Non- Potable rubber-covered cap.

2.05 MANUAL VALVES

A. Plastic Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. NIBCO INC.
2. Description:
   a. Standard: MSS SP-122.
   b. Pressure Rating: 125 psig minimum 150 psig].
   c. Body Material: PVC.
   d. Type: Union.
   e. End Connections: Socket or threaded.
   f. Port: Full.

B. Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. NIBCO INC.
   b. Powell Valves.
   c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-80, Type 2.
   b. Class: 125.
   c. CWP Rating: 200 psig.
   d. Body Material: ASTM B 62 bronze with integral seat and screw-in bonnet.
   e. Ends: Threaded or solder joint.
   f. Stem: Bronze, nonrising.
   g. Disc: Solid wedge; bronze.
   h. Packing: Asbestos free.
   i. Handwheel: Malleable iron, bronze, or aluminum.

C. Operating Wrenches for Iron Gate Valve Casings: Furnish two 2 steel, tee-handle operating wrench(es) with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut for Project.

1. NIBCO INC.
2. Description:
    a. Standard: MSS SP-70, Type I.
    b. CWP Rating: 200 psig.
    c. Body Material: ASTM A 126, gray iron with bolted bonnet.
    d. Ends: Flanged.
    e. Trim: All bronze.
    f. Disc: Solid wedge.
    g. Packing and Gasket: Asbestos free.

2.06 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:
    1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings.
    2. Description: Molded-glass filled nylon body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-VAC solenoid. With captured plunger and 150 -200 psi rating. Slow closing with fabric reinforced diaphragm.

2.07 AUTOMATIC DRAIN VALVES

A. Description: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig.

2.08 TRANSITION FITTINGS

A. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
B. Transition Couplings:
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
        a. Cascade Waterworks Manufacturing.
        b. Dresser, Inc.; DMD Division.
        c. Ford Meter Box Company, Inc. (The).
        d. JCM Industries.
        e. Smith-Blair, Inc; a Sensus company.
        f. Viking Johnson.
    2. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
C. Plastic-to-Metal Transition Fittings:
    1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
        a. Spears Manufacturing Company.
    2. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-socket or threaded end.
D. Plastic-to-Metal Transition Unions:
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        a. Spears Manufacturing Company.

2. Description: MSS SP-107, PVC four-part union. Include one brass or stainless-steel threaded end, one solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

2.09 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or PDI WH 201, with bellows or piston-type pressurized cushioning chamber and in sizes complying with PDI WH 201, Sizes A to F.

B. Pressure Gages: ASME B40.1. Include 4-1/2-inch- diameter dial, dial range of two times system operating pressure, and bottom outlet.

2.10 SPRINKLERS

A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

B. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings

C. Plastic, Surface Spray Sprinklers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings

D. Plastic, Pop-up Spray Sprinklers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings

2.11 CONTROLLERS

A. As noted on plan.

B. Wiring

1. Provide #14 AWG [min. ga.], type UF, single conductor, solid copper wire, color-coded wiring to electric control valves from automatic controller. Wire shall be UL approved for direct underground burial. Exposed wiring leading to controller shall be in a rigid electrical metallic approved tubing. Multi-strand wire is not acceptable.

2. Provide a single wire to each solenoid from controller and a common neutral wire to all solenoids from controller as power supply.

3. Provide two extra zone wires and one extra common wire to furthest valve location with 36-inch loops in standard size valve box.

4. Indicate wire path and size on Contract Drawings.

5. Refer to the Facilities Design Manual for additional requirements.

C. Dry Splice Connectors

1. Rainbird Snap-Tite wire connectors or Spears DS-400 Dri-Splice connectors or approved equal.

2.12 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following shall be black in color:

a. Ametek

B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch minimum to 3 inches maximum.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

B. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.

C. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 18 inches below finished grade.
2. Lateral Piping: 12 inches
3. Sleeves: 24 inches.

D. Trenching:

1. Stake out all sprinkler head and valve locations prior to trenching for review and approval by the owner.
2. Excavate trenches straight and true with bottom uniformly sloped to low points. Make excavations of sufficient depth and width to permit proper handling and installation of the pipe and fittings. Accurately trim trenches to provide a uniform bed, free from loose soil, rocks, debris, and other sharp edged objects before installing pipe and fittings. In areas where trees are present, adjust trench location beyond the drip line of the trees.
3. Trench depths in rocky areas shall be 6” inches below required depth to allow for pipe bedding. Pipe installed in rocky soil shall be bedded in 6” inches of sand.
4. Trench widths shall allow a minimum of 4” inches between pipes laid in the same trench.
5. Provide a minimum of 24” inches and a maximum of 26” inches of cover for all constant pressure mainline. Provide a minimum of 18” inches and a maximum of 20” inches of cover for all mainline located downstream of the master valve. Provide a minimum of 18 inches and a maximum of 20” inches of cover for all lateral lines not under constant pressure. Provide a minimum of 6” inches of cover for all ½” inch distribution tubing.
6. Keep bottom of trench or excavation free and clear of water.
7. Where existing pavement must be cut to install landscape irrigation system, saw-cut smoothly to straight lines 6” inches wider than trench. Concrete sidewalks, curb & gutter, shall be removed to the nearest joint or saw-cut as directed by the owner.
    a. Repair and replace pavement cuts, sidewalks, curb & gutter with equivalent materials and finishes – match existing. Refer to Section [2] and Standard Detail WU3001 for patching.

3.02 PREPARATION

A. Installation

1. General
    a. Prior to installing irrigation heads, stake or otherwise locate trees and shrub planting areas. Avoid laying irrigation lines in root ball zone.
    b. Install irrigation material and equipment and provide necessary hardware in accordance with the Contract Drawings.
    c. All connections to the water distribution system must comply with Standard Specification Section 02665 – Underground Water Lines for Domestic & Fire Protection Systems.
2. PVC Pipe
    a. Main Line: Verify static water pressure at Point of Connection with pressure noted on Contract Drawings. Notify the Owner with any discrepancies prior to proceeding.
    b. Cut pipe square with the axis, using a fine-tooth hand saw, or ratcheting PVC cutter. Blade edge of cutter shall be straight and sharp to assure square burr-free cuts through PVC pipe. Cutter shall have a pipe supporting plate that adjusts to PVC size, and aids in eliminating pipe deformation and cracking. Remove all burrs prior to solvent welding.

c. Inside of pipes shall be clean and free of dirt, debris, and any foreign matter.

d. Apply cleaner and solvent in accordance with ASTM D 2855 and manufacturer's recommendations.

e. All piping in planters is to rest on a gravel filtration layer and is to be placed prior to placement of soil.

f. Cover and protect open pipe ends, fixtures and equipment from dirt, water, and chemical or mechanical damage during installation.

g. Do not lay pipe in water or in trench when weather conditions are unsuitable for work or when temperature is 32 degrees F or below. Pump out or otherwise remove water encountered or accumulated in excavation to keep the bottom of the trench or excavation free and clear of water during installation.

h. Compression or flow span couplings are not permitted.

i. Avoid having irrigation pipe crossovers. When pipes cross there shall be a minimum vertical clearance of 4" inches between the pipes and trenching shall be adjusted accordingly to provide required cover.

j. Vertical stacking of irrigation lines is not permitted. Where pipes are laid in the same trench there shall be a minimum horizontal separation of 4" inches between pipes.

k. There shall be a minimum separation between fittings used on any single piece of pipe of 3" inches between fittings 1 ½" inches or less and 6" inches between fittings 2" inches and larger.

l. Saddle taps are not permitted on lines greater than 2" inches.

m. Drain entire system to a manual drain valve(s) placed at the low point(s) in the system. Drain valve shall be installed on lines of nominal pipe size of 1½" inches or less.

n. Install drain valve in a standard-body plastic valve box with locking cover and sump pit. Drain-gravel backfill shall be 1-cubic foot of cleaned gravel or crushed stone, graded from ¾ inch min. to 1½" inch maximum.

o. Thoroughly clean fixtures, exposed materials, and equipment.

p. Install detectable Line Marking Tape on all main lines and lines > ¾" inch. Place tape 6 "inches above piping.

3.03 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Install unions adjacent to valves and to final connections to other components with NPS 2 or smaller pipe connection.

G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 or larger pipe connection.

H. Install underground thermoplastic piping according to ASTM D 2774.

I. Install expansion loops in control-valve boxes for plastic piping.

J. Lay piping on solid subbase, uniformly sloped without humps or depressions.

K. Install ductile-iron piping according to AWWA C600.

L. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.

M. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.

N. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.

O. Install piping in sleeves under parking lots, roadways, and sidewalks.

P. Install sleeves made of Schedule 40 PVC pipe and socket fittings, and solvent-cemented joints.

Q. Install transition fittings for plastic-to-metal pipe connections according to the following:

1. Underground Piping:

a. NPS 1-1/2 and Smaller: Plastic-to-metal transition fittings.

b. NPS 2 and Larger: AWWA transition couplings.

3.05 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full D. D. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

F. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.

2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

G. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.06 VALVE INSTALLATION

A. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.

B. Aboveground Valves: Install as components of connected piping system.

C. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.

D. Drain Valves: Install in underground piping in boxes for automatic control valves.

E. Setting Valves:

1. Do not locate valves beneath paved surfaces.

2. Install valves in a level position.

3. Install all valves, except backflow preventer, with minimum 24” inches cover. Refer to Section 15051, Piping Systems, for backflow preventer installation.
4. Install an isolation valve at the PoC, and at loop or zone isolation points.
5. Install an isolation valve upstream of each electric control valve. Isolation valve may be installed in same valve box with automatic valve.
6. Manual Drain Valves: install at end and low points of the irrigation system. Additional manual drain valves must be installed if there are multiple low points along the system’s run of pipe where water collection may occur.
7. Install Reduced Pressure or Pressure Vacuum Breakers in accordance with Section 15051, Piping Systems.

F. Install sprinklers after hydrostatic test is completed.

G. Install sprinklers at manufacturer's recommended heights.

H. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.

3.07 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 6” inches from walls and other boundaries such as curbs and walks.

D, Sprinkler Heads,

1. Fully flush entire system prior to the installation of sprinkler and bubbler heads. Cap risers as deemed necessary to achieve adequate flushing.

E. Bubblers:

1. Bubblers shall be spaced 180 degrees apart and 12” inches from edge of root ball. On sloped surfaces – install bubbler on uphill side of plant material to be irrigated.

3.08 VALVE BOX INSTALLATION

A. Valve boxes shall be installed as shown on the detail drawings and located as shown on the drawings.

B. Valve boxes shall be installed at and level with finish grade.

C. Valve boxes shall be engraved or embossed on the top side of the lid with the contents of each valve box. Letters and numbers shall be no smaller than 1 inch and no larger than 1 ½” inches

1. Control Valves – brand” Zone Valve” and the # of that valve into the lid.
2. Quick coupling valve – Brand “Q C “into the lid
3. Wire splices Brand “WS” into the lid.
4. Isolation valves – “IV”
5. Drain Valves – “DV”.
6. Air release – “AR”

3.09 CONNECTIONS

A. Comply with requirements for piping specified in Division 22 Section "Facility Water Distribution Piping" for water supply from exterior water service piping, water meters, protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

C. Connect wiring between controllers and automatic control valves.

3.10 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.

1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Division 31 Section "Earth Moving" for warning tapes.

3.11 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1.Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Any irrigation product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.12 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2 inch above, finish grade.

3.13 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.14 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

END OF SECTION

SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Sodding.

B. Hydro Mulching

1.02 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
   1. Certification of each seed mixture for turf grass sod. Include identification of source and name and telephone number of supplier.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For standardized ASTM D 5268 topsoil, existing native surface topsoil, existing in-place surface soil, and imported or manufactured topsoil.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
   1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association
   2. Experience: Three years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
   3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
   4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
      a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
      b. Certified Turfgrass Professional, designated CTP.
      c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.
   5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
   6. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
   1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
   2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
   3. Report suitability of tested soil for turf growth.
      a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
      b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Preinstallation Conference: Conduct conference at Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

B. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.06 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of substantial completion.
   1. Spring Planting: After May 1st
   2. Fall Planting: Before September 15th.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.07 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
   1. Seeded Turf: 60 days from date of Substantial Completion.
      a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
   2. Sodded Turf: 30 days from date of Substantial Completion.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.01 SEED

A. Grass Seed/Wildflower Mix: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
   1. See plant list on plan for seed type and amount.

2.02 TURFGRASS SOD

A. Turfgrass Sod: Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects], complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass species see plant list on plan.

C. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed.

2.03 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: T, with a minimum of 99 percent passing through No.8 sieve and a minimum of 75 percent passing through No. 60 sieve.

2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
3. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.04 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Retain one of first two paragraphs below, or retain both if applicable. Retain first paragraph if sphagnum peat moss, an acidic peat, is required. Retain second paragraph if peat types with a neutral pH are required.

C. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft**.** of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

2.05 FERTILIZERS

A. Organic fertilizers are derived from several sources. Bonemeal in first paragraph below is organic and primarily phosphorous, has an alkaline reaction, and is nonburning. Other organic fertilizers include blood meal, cottonseed meal, seaweed meal, soybean meal, alfalfa meal, and blends of these materials.

B Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

C., Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.06 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments in the following quantities to produce planting soil:
   1. Ratio of Loose Compost to Topsoil by Volume: 1:3.
   2. Ratio of Loose Wood Derivatives to Topsoil by Volume: 1:3

B. Revise first subparagraph below if a specific type of liming material (ground dolomitic limestone, calcitic limestone, mollusk shells, or other type) is required; coordinate with "Inorganic Soil Amendments" Article.

C. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
   1. Supplement with another specified planting soil when quantities are insufficient.
   2. Mix existing, native surface topsoil with the following soil amendments in the following quantities to produce planting soil:
      a. Ratio of Loose Compost to Topsoil by Volume: 1:3.
      b. Ratio of Loose Wood Derivatives to Topsoil by Volume: 1:3

D. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments in the following quantities to produce planting soil:
   1. Ratio of Loose Compost to Surface Soil by Volume: 1:3.
   2. Ratio of Loose Wood Derivatives to Surface Soil by Volume: 1:3

E. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 2 inches deep; do not obtain from agricultural land, bogs or marshes.
   1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
   2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
      a. Ratio of Loose Compost to Topsoil by Volume: 1:3.
      b. Ratio of Loose Wood Derivatives to Topsoil by Volume: 1:3.

2.07 MULCHES

A. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.08 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.
3. Spread planting soil to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.

b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
   1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
   2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
      a. Apply superphosphate fertilizer directly to surface soil before loosening.
   3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
   4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.04 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.05 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
   1. Do not use wet seed or seed that is moldy or otherwise damaged.
   2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 2 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
   1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch and roll surface smooth.

3.06 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
   1. Mix slurry with nonasphaltic or asphalt-emulsion or fiber-mulch manufacturer's recommended tackifier.
   2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
   3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.07 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
   1. Lay sod across angle of slopes exceeding 1:3.
   2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.08 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
   1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
   2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

I. Apply sod as required for new turf.

J. Water newly planted areas and keep moist until new turf is established.

3.09 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
   1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
   2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
   3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
   1. Schedule watering to prevent wilting, puddling, erosion, Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
   3. First week: Perform watering daily to keep soil on sod pads continuously moist and to maintain moist topsoil to a depth of at least 4 inches. Water to prevent wilting or as approved. Water may be needed more than once a day depending on weather conditions.
   4. Remaining weeks: Perform watering weekly or as needed to keep grass from wilting and to promote growth.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
   1. Mow Bermuda grass to a height of 1/2 inch to 1 inch or less.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.10 SATISFACTORY TURF and GRASSES

A. Turf installations shall meet the following criteria as determined by Architect:
   1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 x 5 inches.
   2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf, wildflowers and grasses that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written

recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

SECTION 32 93 00

PLANTING

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Plants.

B. Planting soils.

C. Tree stabilization.

D. Landscape edgings.

1.02 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

G. Planting Area: Areas to be planted.

H. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

J. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

L. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

M. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

N. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.
   1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
3. Plant Photographs: Include color photographs in digital 3-by 5inch print format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Samples for Verification: For each of the following:
1. Mulch: 1 pint volume of each mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Material Test Reports: For standardized ASTM D 5268 topsoil and existing native surface topsoil and imported or manufactured topsoil.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

G. Warranty: Sample of special warranty.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.
1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.

2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.
    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate

aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Do not remove container-grown stock from containers before time of planting.
2. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
   1. Notify Architect no fewer than two days in advance of proposed interruption of each service or utility.
   2. Do not proceed with interruption of services or utilities without Architect's written permission.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.07 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
      b. Structural failures including plantings falling or blowing over.
      c. Faulty performance of tree stabilization, edgings.
      d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Periods from Date of Substantial Completion:
      a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
      b. Ground Covers, Biennials, Perennials, and Other Plants: Three months.
   3. Include the following remedial actions as a minimum:
      a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
      b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
      c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
      d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.08 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
   1. Maintenance Period: Ends when final punch list items have been completed and accepted by Owner.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance

immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: Ends when final punch list items have been completed and accepted by Owner.

PART 2 - PRODUCTS

2.01 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

E. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.02 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.03 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
   1. Organic Matter Content: 50 to 60 percent of dry weight.
   2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
   1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.04 FERTILIZERS

A. Bone Meal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
   2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
   2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

E. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
   1. Size: 10-gram tablets.
   2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

F. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

2.05 PLANTING SOILS

A. Planting Soil Planting Plan: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
   1. Ratio of Loose Compost to Surface Soil by Volume: 1:3.
   2. Ratio of Loose Wood Derivatives to Surface Soil by Volume: 1:3.
   3. Weight of Sulphur coated fertilizer 15-5-10 with Micronutrients & Iron per 1000 Sq. Ft.: 20lbs
   4. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: 1:3.

2.06 MULCHES

A. Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
   1. Type: Fine Shredded Hardwood Mulch.

2.07 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd..

2.08 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.09 TREE STABILIZATION MATERIALS

A. Stakes:
   1. Stakes: T-Posts painted black.
   2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach.
   3. Tree Guying: 2 Gauge wire.

2.10 LANDSCAPE EDGINGS

A. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings comparable product by one of the following or approved equal:
      a. COL-MET
         1355 Pritchett Industrial Dr.
         Austell, Georgia 30168
         800. 829. 8225
         www.colmet.com
   3. Edging Size: 3/16 inch wide by 4 inches deep.

4. Stakes: Tapered steel, a minimum of 15 inches long.
5. Accessories: Standard tapered ends, corners, and splicers.
6. Finish: Standard paint.
7. Paint Color: Green.

2.11 MISCELLANEOUS PRODUCTS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

B. Burlap: Non-synthetic, biodegradable.

C. Planter Filter Fabric: Woven or Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

D. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
   1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.03 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
      a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   2. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
      a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Finish Grade shall be below finish grade of building for proper drainage away from building.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over prepared soil at application rate indicated on Drawings.

3.04 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
   1. Excavate approximately three times as wide as ball diameter container-grown stock.
   2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
   3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
   4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
   5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
   6. Maintain supervision of excavations during working hours.
   7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

B. Subsoil and topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
   1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.05 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-

most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set container-grown stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
   1. Use planting soil planting plan for backfill.
   2. Carefully remove root ball from container without damaging root ball or plant.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
   5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.06 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.07 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:
   1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend to the dimension shown on Drawings above grade. Set vertical stakes and space to avoid penetrating root balls or root masses. See Tree on drawings.
   2. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
   3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
   4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Staking : Stake trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes 30 inches long, driven to grade.
   1. Site-Fabricated Staking-and-Guying Method:
      a. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
   2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.08 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as noted on the planting plan.

B. Use planting soil as shown on planting details on the drawings for backfill.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.09 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.
   1. Trees in Ornamental Grass Areas: Apply mulch ring of 3-inch average thickness, with 24-inch radius around trunks or stems unless otherwise noted on drawings. Do not place mulch within 3 inches of trunks or stems.
   2. Mulch in Planting Areas: Apply 3-inch average thickness of mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.10 EDGING INSTALLATION

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

3.11 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.12 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.13 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.14 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION

SECTION 33 4600

SUBDRAINAGE

PART 1 GENERAL

1.01 DESCRIPTION:

A. This section specifies providing subway drainage systems except drainage sump pumping systems.

1.02 QUALITY ASSURANCE:
The following Codes, Regulations, Reference Standards, and Specifications apply to work included in this section:

A. Codes and regulations of the jurisdictional authorities.

B. Reference Codes and Standards – Section 01090
1. AASHTO: M252.
2. ASTM: A48, B584, B271, C33, C131, C654, C700, D1785, D2729.
3. FS: QQ – B - 626

1.03 SUBMITTALS:

Submit the following for approval:

A. Product information for all products – perforated pipe, non – perforated pipe, inlets, atrium drains. Include complete catalog information for material and equipment.

PART 2 PRODUCTS

2.01 PLASTIC PIPE AND FITTINGS:

A. Solid, non-perforated, polyvinyl chloride (PVC) pipe: ASTM D2729 or ASTM D1785.

B. Polyethylene, corrugated pipe:
1. AASHTO M252.
2. INDIVIDULA LENGTHS NOT LESS THAN 10 FEET.

C. Fittings:
1. Polyvinyl choloride: ASTM D2729 or ASTM D1785.
2. Polyethylene, corrugated: AASHTO M252.

D. Perforated drainage system as recommended by manufacturer or engineered wood fiber mulch and/or as specified on the drawings.

2.02 CASTINGS:

A. Drainage Castings:
1. Drain inlets, cleanouts, floor and scupper drains: Fabricated from cast iron, ASTM A48, Class 25B with brass parts, Alloy Number 844; or ductile iron, ASTM A 536., Grade 60 – 40 18.
2. Leaded red brass and leaded semi – red brass sand castings: ASTM B584.
3. Copper base alloy centrifugal castings: ASTM B271.

B. Drainage Casting Covers:
1. Cast Irion: ASTM A48, Class 30B.

2. Ductile Iron: ASTM A534, Grade 60 – 40 – 18.
3. Leaded red brass: FS QQ B – 626.

2.03 POROUS SUBGRADE MATERIAL

A. Coarse aggregate: ASTM C33, Size No. 67.

B. Maximum percentage of wear: 45 percent when tested in accordance with ASTM C131

PART 3 – EXECUTION

3.01 EXCAVATION:

Excavate to lines and grades shown in accordance with section 31 01 00, “Earthwork”.

3.02 POROUS MATERIAL PLACEMENT:

A. Place porous material for subgrade around main track drain and drain pipes and for trench backfill as shown.

B. In rock excavation, place material only on stable rock surfaces. Do not place porous subrade material on excavated rock surface until surface has been flushed with water to remove fine dust and sludge.

3.03 PLASTIC PIPE:

A. Lay plastic pipe as specified for porous concrete pipe.

B. Use cast iron, concrete, or vitrified clay pipe for last two feet at exposed termination points. Provide standard adapter fittings for connections between differing pie materials.

C. Use nonpressure pipe for drainage.

D. Plastic pipe may be used only if buried or encased in concrete. Its use is prohibited in exposed locations.

E. Lay pipe to provide positive drainage.

3.04 INSTALLATION OF PIPE AND CASTINGS:

A. Install drainage piping to the lines and grades shown. Set inlets relative to finish grade as indicated on the drawings.

B. Locate drainage castings and set to the finished floor elevation, slabs, or inverts.

C. Install cleanouts at the locations shown or a minimum of every 50 linear feet.

3.05 PROTECTON OF DRAINAGE SYSTEM:

A. During the course of construction, maintain drainage lines free of debris and in undamaged condition.

B. Plug or close ends of completed runs of piping until the Owner’s representative approves their use.

C. Cover the inlet end of drainage piping used to convey water to wet wells at the existing drainage pumping stations with wire mesh screen.

3.06 CONNECTIONS TO SYSTEMS:

A. Provide connection to existing storm sewer per NCTCOG standards, details and specifications.

B. Connect playground subdrainage system to the drainage system for the wood fiber per manufacturer's requirements.

3.07 FIELD QUALITY CONTROL:

A. Where drainage piping is located below invert slabs, conduct a ball, shuttlecock, or mandrel test to ensure that the line is free of obstructions subsequent to the placing of porous subgrade material over the line and prior to the placement of the concrete invert slab.

B. Upon completion of the test and determination that the line is free of obstructions, plug, cap or otherwise close the open end or ends of the installed piping to prevent the entrance of debris into the lines.

C. Immediately prior to final inspection of the work, remove debris from manholes, drain inlets, and floor scupper drains. In the presence of the Contracting Officer, provide by one of the methods specified above that the piping is free of obstructions.

3.08 CLEAN - UP

A. Daily removal of rubbish and debris caused by this work from the site.

END OF SECTION 334600