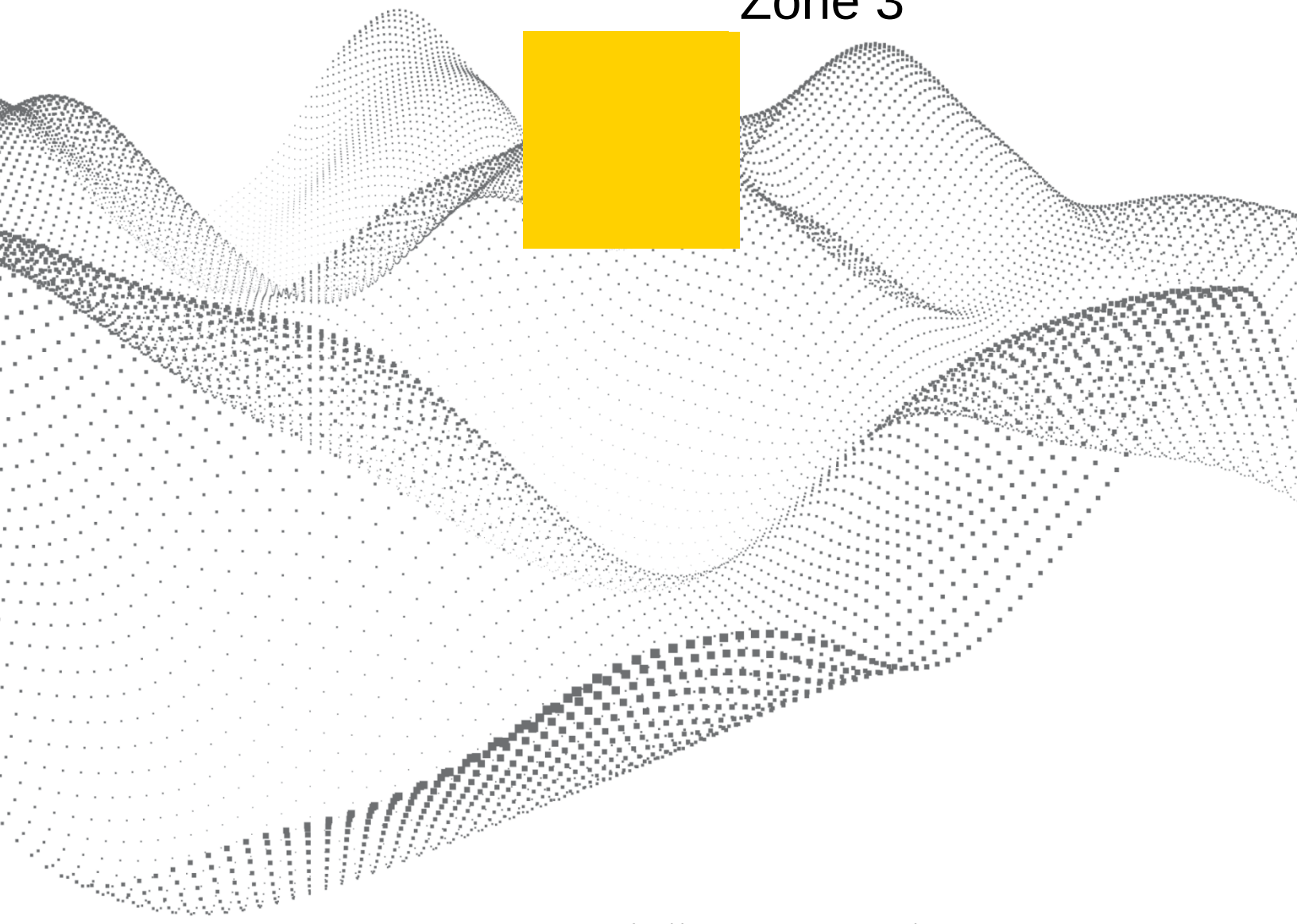


PROJECT MANUAL

Fort Bend ISD BP048 -
HVAC MEP West
Zone 3



Issue for Bid
11 December 2025
25241.0000

———— Corgan Associates, Inc.
9 Greenway Plaza
Houston, TX 77046
832 652 3640

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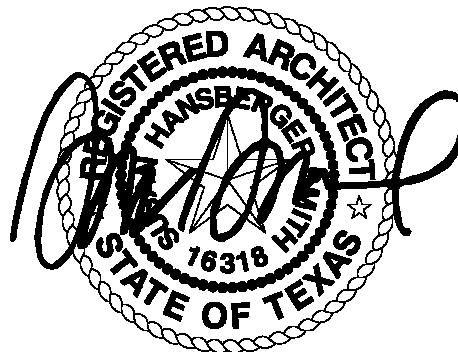
SEALS PAGE

Project Manual

Issue for Bid
11 December 2025
25241.0000

Fort Bend ISD BP048 - HVAC MEP West Zone 3

ARCHITECT OF RECORD
Corgan Associates, Inc.
9 Greenway Plaza
Houston, TX 77046
832 652 3640
Responsible for Sections marked with
(CAI) in Document 00 01 10 "Table of
Contents."



Architect of Record

12/11/25

Date

MEP ENGINEER OF RECORD
YW-Squared, LLC
2508 Reppart Place
Houston, Texas 77008
832 384 4178
Firm License #: F-22107
Responsible for Sections marked with
(YWS) in Document 00 01 10 "Table of
Contents."



_____	12/11/25
MEP Engineer of Record	Date

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END OF DOCUMENT

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Fort Bend Independent School District

Competitive Sealed Proposal for

**BP048 HVAC – MEP West Zone 3
CSP 26-036KB**

**Package A Base Bid and all documents except Alternates & SBE documents.
DUE NO LATER THAN 2:00 PM Central Time CST February 5, 2026**

**Package B Alternates and Package C SBE
DUE NO LATER THAN
3:00 PM Central Time CST February 5, 2026**

**Bids will be opened and read aloud at 3:00 PM. Package A is still due at 2:00 PM CST
and will be held by the district until the public opening at 3:00 PM CST.
LATE PROPOSALS WILL NOT BE ACCEPTED**

SUBMIT PROPOSAL PACKET THROUGH:

FBISD Bid Portal: <https://fortbendisd.bonfirehub.com/portal/>

Signed by:
Juan Valdez
D65E219662EF4EE...

12/4/2025

Signed by:
Ryan Kiefer
1F973D1CC81A41D...

12/4/2025

Signed by:
Brinda Garcia
F7F6B096D7C742E...

12/4/2025

Signed by:
[Signature]
DF25AD47E418421...

12/9/2025

BP048 HVAC – MEP West Zone 3
CSP 26-036KB

BACKGROUND:

Fort Bend ISD (FBISD) is a K-12 public school district in Fort Bend County serving a student enrollment of over 75,000. The district currently consists of 83 campuses and multiple administrative sites. The intention of this Competitive Sealed Proposal (CSP) is to solicit proposals for the renovation of the mechanical, electrical, and plumbing systems of seven campuses, Austin HS, Bowie MS, Crockett MS, Garcia MS, Hodges Bend MS, Travis HS & Walker Station ES (BP048). The estimated construction cost for all of the seven packages of work for this project is **Five Million, One Hundred Thousand Dollars. (\$5,100,000.00).**

PRE-PROPOSAL CONFERENCE:

A pre-proposal conference will be held on **Tuesday, January 13, 2026 at 2:00 PM CST** meeting will be held virtually using Microsoft Teams. Attendance is highly recommended in order to have an understanding of the requirements of this CSP. For this pre-proposal meeting, persons with disabilities requiring special accommodations should contact: Kathleen Booker at kathleen.booker@fortbendisd.gov at least two (2) days before the conference. Any questions/clarifications that result from the visit should be submitted through the **Ask a Question** section in Bonfire.

Meeting Link: [Join the meeting now](#)

WALK SCHEDULE:

A pre-proposal walk is scheduled for **Wednesday, January 14, 2026, 8:00 AM (CST)** to tour each campus. Attendance is highly recommended in order to have an understanding of existing site conditions and the project's scope of work. Please arrive 30 minutes early for badging. The walk schedule is listed below.

1. Crockett MS 19001 Beechnut St. Richmond, TX 77407	8:00 AM
2. Hodges Bend MS 16510 Bissonnet St. Houston, TX 77083	9:00 AM
3. Austin HS 3434 Pheasant Creek Dr. Sugar Land, TX 77498	10:00 AM
4. Garcia MS 18550 Old Richmond Rd. Sugar Land, TX 77498	11:00 AM
5. Travis HS 11111 Harlem Rd, Richmond, TX 77406	12:00 PM

6. Bowie MS 700 Plantation Dr. Richmond, TX 77406	1:00 PM

SPECIAL NOTE:

Please be reminded that all Fort Bend ISD campuses and departments are tobacco, drug, and weapon-free facilities. Contractors are responsible for the conduct of their employees and adherence to Fort Bend ISD building policies.

QUESTIONS AND ANSWERS:

Any questions or needed clarifications shall be submitted through the **Ask a Question** section in Bonfire before the deadline for questions due date and time **Wednesday, January 21, 2026 10:00 AM CST**. Questions received by the deadline and corresponding answers will be included in an Addendum and posted in FBISD e-bidding portal, Bonfire.

All Fort Bend ISD procurement solicitations and addendums can be accessed on Bonfire at <https://fortbendisd.bonfirehub.com> PLEASE NOTE THAT IT IS THE RESPONSIBILITY OF THE PROPOSERS TO CHECK FOR ANY ADDENDUMS ON THE BONFIRE ELECTRONIC BIDDING SYSTEM PRIOR TO SUBMITTING A PROPOSAL.

GENERAL TERMS, CONDITIONS, AND REQUIREMENTS FOR SOLICITATIONS:

This solicitation shall be governed by the documents incorporated herein as well as the Fort Bend ISD General Provisions for Purchasing Solicitations are incorporated herein. A copy may be obtained at [general-provisions-for-purchasing-solicitations-and-contracts.pdf](#) or by contacting the Fort Bend ISD Buyer listed on the coversheet.

Copy of the Construction contract, the A101 and A 201, are incorporated herein.
Texas Education Code 44.031(a)(5); Texas Government Code Chapter 2269
Purchasing and Acquisition, FBISD Policy CH (Legal)
Purchasing and Acquisition, FBISD Policy CH (Local)
Facilities and Construction, FBISD Policy CV (Legal)
Facilities and Construction, FBISD Policy CV (Local)

Proposers are required to respond to all requests identified in this CSP and indicate their acceptance or objection to the terms of the CSP, the General Provisions, and the terms of the Agreement for Construction Services. Any exceptions to the terms and conditions in the CSP, the General Provisions, or the Agreement for Construction Services must be clearly indicated in the Proposer's submitted proposal. Each Proposer, by submitting its proposal, represents that the Proposer has read, understands, and agrees with the CSP, the General Provisions, and the Agreement for Construction Services, excluding any exception specifically made by Proposer in its proposal.

VENDOR COMMUNICATION:

Please remember that during the selection process, FBISD desires to avoid even the perception of preferential treatment.

Therefore:

- Other than the designated contact person listed in this CSP: All Communication regarding this CSP with District employees, staff, consultants, Architects/Engineers or Board members is strictly forbidden and may result in disqualification.
- All requests for clarification must be provided in writing through the e-bidding portal **Ask a Question** section to the designated contact person.
- The answer to the request for clarification and all other communication, clarification, or questions regarding this CSP will be issued in writing to all participating firms through the e-bidding portal (Bonfire).

Scope of Work

FBISD is seeking a contractor to provide a turnkey solution as well as upgrades for the renovation of the mechanical, electrical, and plumbing systems of seven campuses, Austin HS, Bowie MS, Crockett MS, Garcia MS, Hodges Bend MS, Travis HS and Walker Station ES (BP048). The scope of work also includes but not limited to the demolition and replacement of existing MEP equipment and piping as documented at each campus.

Contractor Experience and References

Contractor must provide customer references letter in order to receive points in the evaluation criteria section. Contractor must provide proof of pertinent experience (previous educational experience) along with documentation of successful completion of projects completed within the last 3 to 5 years with a minimum construction cost for interior K-12 MEP renovations at approximately \$5,000,000.

For information and questions regarding this CSP process, please contact:

Senior Buyer: Kathleen Booker

Email: kathleen.booker@fortbendisd.gov

EVALUATION CRITERIA:

Proposals shall be evaluated using the evaluation criteria listed below, and the scope of work will be awarded by Project. Based on scope of work, FBISD reserves the right to award the Project to the top ranked contractor in the manner that provides the best value to the district based on price and other evaluation criteria.

	Evaluation Criteria (Government Code 2269)	Point System
1	The price; Section 2269.055.a (1) Total Proposed Pricing - Provides thoroughly developed, competitive pricing using the tables in Pricing Delivery information section of the CSP	40 points
2	Offeror's experience and reputation; Section 2269.055.a (2) Provides evidence of your experience in planning, staging and delivery of recent projects of similar scope and scale (14 pts) Past experience with FBISD and other school districts Provides a summary of nature of work, on time delivery and quality of work contracted with FBISD and/or other school districts and FBISD's assessment of the presented summary. (5 pts)	19 points
3	Quality of the offeror's goods or services; Section 2269.055.a (3) Contractor's products should be new and be of the highest quality with an option to substitute for a company branded item of equivalent quality. (14pts) Quality of contractor's response in the proposal Effectively responds and processes all request for information and documentation included in this CSP (2pts) Project Plan and schedule (5pts)	21 points
4	Utilization of historically underutilized businesses; Section 2269.055.a (4)	N/A
5	Offeror's safety record; Section 2269.055.a (5) Provides a summary of Experience Modification Rate (EMR) for the last three years, as well as a summary of your company's safety policies and procedures	5 points
6	Offeror's proposed personnel; Section 2269.055.a (6) Proposed Personnel, personnel directly assigned to work on this project	5 points
7	Offeror's financial capability appropriate to the size and scope of the project; Section 2269.055.a (7) Provide proof of Insurance, financial stability and Letter of Surety from Bonding Company	5 points
8	SBE Commitment; CV (Local) 2017.04	5 points
	TOTAL	100

TIME TABLE:

FBISD anticipates following the time table listed below for this proposal: **The time table is only an estimate and actual dates may vary.**

Item	Activity	Date
1.	Job starts to advertise (1 st run)	12/21/2025
2.	Job advertises (2 nd run)	12/28/2025
3.	Pre-Proposal Conference 2:00 PM CST	1/13/2026
4.	Final Questions due 10:00 AM CST	1/21/2026
5a.	Proposal Package “A” Due 2:00 PM CST Base Bid and all documents, except Alternates and SBE documents Click or tap here to enter text.	2/5/2026
5b.	Proposal Package “B” Due 3:00 PM CST Alternates only	2/5/2026
5c.	Proposal Package “C” Due 3:00 PM CST SBE documents only	2/5/2026
6.	Presentation to Board of Trustees for contract award (Tentative, subject to change)	04/2026
7.	Tabulations and awards posted to https://fortbendis.bonfirehub.com/portal/?tab=pastOpportunities	04/2026
8.	Substantial Completion of the Work	7/31/2027

SUBMISSION DEADLINE:

Fort Bend ISD will accept proposals submitted electronically through Bonfire e-bidding portal until **Thursday, February 5, 2026 at 2:00 PM CST**. <https://fortbendis.bonfirehub.com>.

Proposals must be uploaded and finalized prior to the closing date and time. Proposals received after the opening will not be accepted. Public bid opening will be conducted via Microsoft Teams **Thursday, February 5, 2026 at 3:00 PM CST**.

Meeting Link: [Join the meeting now](#)

It is recommended that once you have completed your final submission and received a notice status of “Submission Complete” from Bonfire, you access your account again and review the documents to verify that the correct content has been provided.

Once the close date has passed, you will be unable to submit an opportunity or make changes to any of the submitted documents. **HARD-COPY PAPER FAXED OR E-MAILED SUBMISSIONS WILL NOT BE ACCEPTED.** Only responses properly submitted to FBISD Bonfire Purchasing Portal will be considered.

Prevailing Wage Rate Determination Information

The following information is from Chapter 2258 Texas Government Code:

Sec. 2258.021. Right to be Paid Prevailing Wage Rates.

- (a) A worker employed on a public work by or on behalf of the state or a political subdivision of the state shall be paid:
 - (1) not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the work is performed; and
 - (2) not less than the general prevailing rate of per diem wages for legal holiday and overtime work.
- (b) Subsection (a) does not apply to maintenance work.
- (c) A worker is employed on a public work for the purposes of this section if the worker is employed by a contractor or subcontractor in the execution of a contract for the public work with the state, a political subdivision of the state, or any officer or public body of the state or a political subdivision of the state.

Sec. 2258.023. Prevailing Wage Rates to be paid by Contractor and Subcontractor; Penalty.

- (a) The contractor who is awarded a contract by a public body or a subcontractor of the contractor shall pay not less than the rates determined under Section [2258.022](#) to a worker employed by it in the execution of the contract.
- (b) A contractor or subcontractor who violates this section shall pay to the state or a political subdivision of the state on whose behalf the contract is made, \$60 for each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates stipulated in the contract. A public body awarding a contract shall specify this penalty in the contract.
- (c) A contractor or subcontractor does not violate this section if a public body awarding a contract does not determine the prevailing wage rates and specify the rates in the contract as provided by Section [2258.022](#).
- (d) The public body shall use any money collected under this section to offset the costs incurred in the administration of this chapter.
- (e) A municipality is entitled to collect a penalty under this section only if the municipality has a population of more than 10,000.

Sec. 2258.051. Duty of Public Body to Hear Complaints and Withhold Payment.

A public body awarding a contract, and an agent or officer of the public body, shall:

- (1) take cognizance of complaints of all violations of this chapter committed in the execution of the contract; and
- (2) withhold money forfeited or required to be withheld under this chapter from the payments to the contractor under the contract, except that the public body may not withhold money from other than the final payment without a determination by the public body that there is good cause to believe that the contractor has violated this chapter.

Prevailing Wage Rates – School Construction Trades

June 2, 2025

Texas Gulf Coast Area

CLASSIFICATION	2025 HOURLY RATE
ASBESTOS WORKER	\$27.20
BRICKLAYER; MASON	\$24.90
CARPENTER; CASEWORKER	\$23.13
CARPET LAYER; FLOOR INSTALLER	\$26.20
CONCRETE FINISHER	\$23.83
DATA COMM/TELE COMM	\$24.33
DRYWALL INSTALLER; CEILING INSTALLER	\$24.33
ELECTRICIAN	\$29.86
ELEVATOR MECHANIC	\$39.78
FIREPROOFING INSTALLER	\$22.99
GLAZIER	\$23.25
HEAVY EQUIPMENT OPERATOR	\$22.17
INSULATOR	\$21.95
IRONWORKER	\$26.50
LABORER, HELPER	\$19.81
LATHERER; PLASTERER	\$22.75
LIGHT EQUIPMENT OPERATOR	\$28.75
METAL BUILDING ASSEMBLER	\$24.00
PAINTER; WALL COVERING INSTALLER	\$20.17
PIPEFITTER	\$29.82
PLUMBER	\$27.98
ROOFER	\$22.50
SHEET METAL WORKER	\$29.96
SPRINKLER FITTER	\$23.00
STEEL ERECTOR	\$26.00
TERRAZZO WORKER	\$22.75
TILE SETTER	\$22.00
WATERPROOFER; CAULKER	\$24.00

This document was developed by PBK Architects, Inc., in strict accordance with Chapter 2258 of the Texas Government Code.

Worker Classification Definition Sheet

CLASSIFICATION	DEFINITION
ASBESTOS WORKER	Worker who removes and disposes of asbestos materials.
BRICKLAYER; MASON	Craftsman who works with masonry products, stone, brick, block, or any material substituting those materials and accessories.
CARPENTER; CASEWORKER	Worker who build wood structures or structures of any material which has replaces wood. Includes rough and finish carpentry, hardware and trim.
CARPET LAYER; FLOOR INSTALLER	Worker who installs carpets and /or floor coverings, vinyl tile.
CONCRETE FINISHER	Worker who floats, trowels, and finishes concrete.
DATA COMM/TELE COMM	Worker who installs data/telephone and television cable and associate equipment and accessories.
DRYWALL; CEILING INSTALLER	Worker who installs metal framed walls and ceiling, drywall coverings, ceiling grids, and ceilings.
ELECTRICIAN	Skilled craftsman who installs or repairs electrical wiring and devices. Includes fire alarm systems and HVAC electrical controls.
ELEVATOR MECHANIC	Craftsman skilled in the installation and maintenance of elevators.
FIREPROOFING INSTALLER	Worker who sprays or applies fire proofing materials.
GLAZIER	Worker who installs glass, glazing, and glass framing.
HEAVY EQUIPMENT OPERATOR	Includes but not limited to: all CAT tractors, all derrick-powered, all power operated cranes, back-hoes, back-fillers, power operated shovels, winch trucks, and all trenching machines.
INSULATOR	Worker who applies, sprays, or installs insulation.
IRONWORKER	Skilled craftsman who erects structural steel framing, and installs structural concrete Rebar.
LABORER, HELPER	Worker qualified for only unskilled or semi-skilled work. Lifting, carrying materials or tools, hauling, digging, clean up.
LATHERER; PLASTERER	Worker who installs metal framing and lath. Worker who applies plaster to lathing and installs associated accessories.
LIGHT EQUIPMENT OPERATOR	Includes but not limited to , air compressors, truck crane drivers, flex planes, building elevators, form graders, concrete mixers less than 14cf), conveyers.
METAL BUILDING ASSEMBLER	Worker who assembles pre-made metal buildings.
PAINTER; WALL COVERING INSTALLER	Worker who prepares wall surfaces and applies paint and/or wall coverings, tape, and bedding.
PIPEFITTER	Trained worker who installs piping systems, chilled water piping and hot water (boiler) piping, pneumatic tubing controls, chillers, boilers, and associated mechanical equipment.
PLUMBER	Skilled craftsman who installs domestic hot and cold water piping, waste piping, storm system piping, water closets, sinks, urinals, and related work.
ROOFER	Worker who installs roofing materials, Bitumen (asphalt and coal tar) felts, flashings, all types of roofing membranes, and associated products.
SHEET METAL WORKER	Worker who installs sheet metal products, Roof metal, flashings and curbs, ductwork, mechanical equipment, and associated metals.
SPRINKLER FITTER	Worker who installs fire sprinklers systems and fire protectant equipment.
STEEL ERECTOR	Worker who erects and dismantles structural steel frames of buildings and other structures.
TERRAZZO WORKER	Craftsman who places and finishes Terrazzo
TILE SETTER	Worker who prepares wall and/or floor surfaces and applies ceramic tiles to these surfaces.
WATERPROOFER; CAULKER	Worker who applies water proofing material to buildings. Products include sealant, caulk, sheet membranes, and liquid membranes, sprayed, rolled or brushed.



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Instructions to Bidders:

Bidders Communication

Please remember that during the selection process, we desire to avoid even the perception of preferential treatment.

Therefore:

- Other than the designated contact person listed in this CSP: All Communication regarding this CSP with district employees, staff, consultants (Architects/Engineers), or Board members is strictly forbidden and may result in disqualification.
- All requests for clarification must be provided in writing to the designated person.
- The answer to the request for clarification and all other communication, clarification, or questions regarding this CSP will be issued in writing by addenda to all participants.

The district electronic bidding portal <https://fortbendisd.bonfirehub.com/portal/> is the source for all CSP documents and direction; Addenda, Proposal packet, Drawings and specifications.

- **VERY IMPORTANT**
 - Communication regarding this CSP with district employees, staff, consultants (Architects/Engineers), or Board members is strictly forbidden and may result in disqualification. (Other than the designated contact person listed in this CSP.)

CSP Process for Successful Bidders

1.0 GENERAL INFORMATION

- 1.1 The Proposer will furnish and pay for a bid bond in the form of a bid bond, postal money order, certified check or cashier's check in the amount of five percent (5%) of the total greatest amount, bid including any applicable alternates, in accordance with Section 6.0.
- 1.2 If awarded, the Bidder shall furnish and pay for a Performance Bond and a Payment Bond each in the full contract amount in accordance with Section 7.0. Include this cost in your bid.
- 1.3 Bidder shall carry and keep in full force for the duration of the Project, insurance coverage for builder's risk, workmen's compensation, comprehensive general liability, and automobile liability as required by the General Provisions and/or Supplementary General Conditions of the Specifications, as outlined in Section 8.0.
- 1.4 The Bidder will assign a competent full-time superintendent, to the project, and that superintendent shall be maintained on the project for the duration of the project, subject only to his continuous employment.
- 1.5 During this process all communication regarding this CSP with district employees, staff, consultants (Architects/Engineers), or Board members is strictly forbidden and may result in disqualification. (Other than the designated contact person listed in this CSP)
- 1.6 In accordance with Texas Government Code Section 2269, The Board of Trustees, as appropriate, has delegated its authority under this subchapter regarding an action authorized or required by this subchapter to be taken by a school district to the Ft Bend ISD Superintendent. In procuring the construction services, the Board of Trustees has delegated the ranking, selection, or evaluation of bids.
- 1.7 In determining the award of contract and in accordance with Texas Government Code Section 2269, the district may consider: the price, the offeror's experience and reputation, the quality of the offeror's goods or services, the impact on the ability of the governmental entity to comply with rules relating to historically underutilized businesses, the offeror's safety record, the offeror's proposed personnel, whether the offeror's financial capability is appropriate to the size and scope of the project; and any other relevant factor specifically listed in the request for bids, proposals, or qualifications.
- 1.8 **Evaluation of the proposed substitutes/deviations does not constitute Owner's acceptance of the substitutes/deviations but can be considered during negotiations.**
- 1.9 In accordance with Texas Government Code Section 2269, The district shall select the offeror that submits the proposal that offers the best value for the governmental entity based on:
 - the selection criteria in the request for proposal and the weighted value for those criteria in the request for proposal; and
 - its ranking evaluation.
- 1.10 In accordance with Texas Government Code Section 2269 the Board of Trustees has determined the method that provided the best value for the district is the Competitive Sealed Proposal method.
- 1.11 In accordance with Texas Government Code Section 2269 the district shall publish in the request for proposals or qualifications the criteria that will be used to evaluate the offerors, and the applicable weighted value for each criterion.
- 1.12 In accordance with Texas Government Code Section 2269 the district shall document the basis of its selection and shall make the evaluations public not later than the seventh day after the date the contract is awarded.
- 1.13 In accordance with Texas Government Code Section 2269, the district will receive, publicly open, and read aloud the names of the offerors and their bids.
- 1.14 In accordance with Texas Government Code Section 2269, the district will evaluate and rank each proposal submitted no later than 45 days after the opening.
- 1.15 In accordance with Texas Government Code Section 2269, The district shall first attempt to negotiate a contract with the selected offeror. The district and its architect or engineer may discuss with the selected offeror options for a scope or time modification and any price change associated with the modification. If the district is unable to negotiate a satisfactory contract with the selected offeror, the district shall, formally and in writing, end negotiations with that offeror and proceed to the next offeror in the order of the selection ranking until a contract is reached or all proposals are rejected.

2.0 COMPETITIVE SEALED BID DOCUMENTS PRE-BID

2.1 A Pre-proposal conference will be held as required. Representatives of the Owner, and design team will be present at this meeting. All Bidders are encouraged to attend.

3.0 COMPETITIVE SEALED PROPOSAL PACKET

3.1 Bids will be received only on the Owner's "Bid Form" for the work as indicated by the proposal documents, filled in, and submitted in Bonfire as listed below. Bids will be received at no other place.

3.2 Bonfire Submittal Organization

SUBMIT PROPOSAL PACKET THROUGH:

<https://fortbendisdbonfirehub.com/portal/>

Submission Package "A"	
CSP Cover Page Addenda Acknowledgment Section Bid Bond Base Bid Form	DUE on Bid Day at 2:00 PM
All required Forms	DUE on Bid Day at 2:00 PM
Financial Section	DUE on Bid Day at 2:00 PM
Safety Manual	DUE on Bid Day at 2:00 PM
Submission Package "B"	
	Submit Through Bonfire E-Bidding Portal Package "B" DUE same day at 3:00PM
Alternate Pricing	
Submission Package "C"	
SBEP commitment Submission	Submit Through Bonfire E-Bidding Portal Package "C" DUE same day at 3:00PM

4.0 INTERPRETATION OF COMPETITIVE SEALED PROPOSAL DOCUMENTS

- 4.1 Bidders and sub-Bidders requiring “CSP” clarification or interpretation of the CSP documents shall make the request in written form, by email to FBISD buyer listed in the CSP documents.
- 4.2 Any interpretation, correction or change of the CSP documents will be made by Addendum and posted to our website. Interpretations, corrections or changes of the CSP documents made in any other manner will not be binding.

5.0 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

- 5.1 Substitutions of Goods. The materials, products and equipment described in the CSP documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. The materials and equipment named in, and the procedures covered by these specifications have been selected as a standard because of quality, particular suitability or record of satisfactory performance. It is not intended to preclude the use of equal or better See (Part V, Section 3.9 of General Provisions)
- 5.2 If the Owner/Engineer approves any proposed substitution prior to receipt of bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
- 5.3 No deviations are allowed in the base bid or base bid adjustment. Any deviation from the Base Bid shall be submitted as Alternate No. 2 on the Deviations Form.
- 5.4 Evaluation of the proposed substitutes/deviations does not constitute Owner’s acceptance of the substitutes/deviations but can be considered during negotiations.
- 5.5 Price scores will be based on the base bid plus/minus the base bid adjustment which must be in adherence to all plans and specifications published.

6.0 BID BOND/BID GUARANTEE

- 6.1 Bid bonds are required for bids in excess of \$25,000. A Bid bond will be submitted in the form of a Bid bond, postal money order, certified check or cashier’s check in an amount not less than **five percent (5%) of the total greatest amount bid, including any applicable alternates**, payable without recourse to Fort Bend Independent School District. Failure to furnish a bid guarantee in the proper form and amount by the time set for opening may be cause for rejection of the bid. If the successful Bidder, upon acceptance of his bid by the District within the period specified therein for acceptance, fails to execute such further contractual documents, if any, and give such bond(s) (i.e., performance bonds, payment bonds, delivery, etc.) as may be required within the time specified (ten [10] calendar days if no period is specified) after receipt of the forms by him, then he shall be liable for any cost of procuring the work which exceeds the amount of his bid, and the bid guarantee shall be available toward offsetting such difference.

7.0 PERFORMANCE BOND AND PAYMENT BOND

- 7.1 Performance bonds are required for bids in excess of \$100,000. Payment Bonds are required for bids in excess of \$25,000 Gov't Code 2253.021
- 7.2 .When a performance or payment bond is required, the amounts shall be for 100% of the contract amount (including contingency). Any required bond(s) must be filed with the District within 10 days from the date of the Notice Of Award.
- 7.3 The only forms of surety acceptable as a performance or payment bond are: Cashier's Check, Certified Check, or a Surety or Blanket Bond from a company chartered or authorized to do business in Texas. Bonds completed (signed) by an out-of-Texas surety require a counter signature by a Texas resident agent of a company chartered or authorized to do business in Texas.
- 7.4 Bonds and other forms of surety must be made payable to Fort Bend Independent School District.
- 7.5 Bonds in excess of \$100,000 must be from a surety that holds a Certificate of Authority from the United States Department of Treasury or have reinsurance for liability in excess of \$100,000 from a United States Treasury listed reinsurer.
- 7.6 Payment and Performance Bonds must be in accordance with Texas Government Code 2253.

8.0 INSURANCE

Exhibit A

FORT BEND I.S.D. CONSTRUCTION BOND & INSURANCE REQUIREMENTS

It is suggested that this Exhibit be provided to the Contractor's insurance provider.

Contractor shall not commence work until all required bonds and insurance coverages have been obtained and such insurance has been reviewed and accepted by the District. Certificates of Insurance on the current ACORD form shall be issued to the District showing all required insurance coverages.

Bonds Required

Construction, installation and service contracts (including repair and alteration) exceeding \$100,000 requires that a 100% Performance Bond be furnished by the successful bidder (contractor). Contracts exceeding \$25,000 require that a 100% Payment Bond be furnished by the successful bidder (contractor). All such bids must include a 5% Bid Bond.

Bonds shall be issued by a company authorized to do business in the State of Texas with an A.M. Best Company rating of at least A- X and included on the U.S. Department of the Treasury Listing of Approved Sureties (Dept. Circular 570). The contractor shall be responsible for obtaining bonds and shall absorb any and all costs of such Bonds.

<u>Insurance Required</u>	<u>Limit Required</u>
Automobile Liability insurance covering Any Auto	\$1,000,000 Combined Single Limit
Comprehensive (Commercial) General Liability insurance including Products, Completed Operations, Independent Contractors, Broad Form Property Damage, Pollution and Blanket Contractual Liability coverages. XCU exclusions to be removed when underground work is performed.	\$1,000,000 Occurrence \$2,000,000 Aggregate \$1,000,000 Personal Injury \$ 500,000 Fire Damage \$ 5,000 Medical Payments Per Project Aggregate (CG 70 49) Evidence of coverage must be shown on certificates of insurance.
Professional Errors & Omissions Liability insurance may be required from all contractors and licensed or certified as professionals; e.g., engineers, architects, insurance agents, physicians, attorneys, banks, financial consultants, etc.	One time project amount; \$1,000,000 Occurrence & Aggregate minimum, \$5,000,000 Maximum Limit Retroactive Date preceding date of contract must be shown Extended Reporting Period three years past completion of contract
Workers Compensation insurance with limits to comply with the requirements of the Texas Worker Compensation Act Employers Liability insurance	Statutory Limits \$1,000,000
Umbrella or Excess Liability insurance (excess of primary General Liability, Automobile Liability and WC Coverage B) Applicable to minimum contract amounts of \$100,000	100% of Contract Amount up to a maximum of \$25,000,000. For construction contracts in excess of \$25,000,000 higher limits may be required.

Limits for primary policies may differ from those shown when Umbrella or Excess Liability insurance is provided.

All Risk Builders Risk Property Insurance shall be required for all construction contracts when property of the owner is at risk or in the care, custody and control of the Contractor. Builders Risk insurance shall be required for all construction contracts requiring a bond. All Property insurance shall include coverage against the perils of Flood and Earthquake. (Installation Floater may be substituted when contract involves installation only.)	Contract Limit or Replacement Cost Value of Scope of Work whichever is greater Permission to Occupy granted Deductible: 1% of contract, \$50,000 maximum, unless otherwise approved by the Owner.

Insurance Conditions

All insurance coverages shall be issued on an Occurrence basis (except Professional Liability) by companies acceptable to District and licensed to do business in the State of Texas by the Texas Department of Insurance. Such companies shall have a Best's Key rating of at least "A- X".

All certificates must include:

1. The location or description and the bid number, CSP number or Purchase Order number
2. A 30 day notice of cancellation of any non-renewal, cancellation or material change to any of the policies
3. "Additional Insured" on the Property, General Liability, Automobile Liability and Umbrella (Excess) Liability policies naming the District.
4. A "Waiver of Subrogation" clause in favor of the District will be attached to the Workers Compensation, General Liability, Automobile Liability, Umbrella Liability and the Property insurance policies.
5. In addition to certificates of insurance, copies of policy endorsements must be provided (a) listing the District as Additional Insured, and (b) showing waivers of subrogation in favor of the District: CG2010, CG2037, CG2404, CA0070, CA0032, WC0003 or their equivalents.

All insurance must be maintained for one year following substantial completion with Certificates of Insurance provided.

Contractor shall be responsible for payment of all deductibles; the District shall approve the deductibles selected.

If any policy has aggregate limits, a statement of claims against the aggregate limits is required.

The District reserves the right to review the insurance requirements during the effective period of any contract to make reasonable adjustments to insurance coverages and limits when deemed reasonably prudent by District based upon changes in statutory laws, court decisions or potential increase in exposure to loss.

FORT BEND Independent School District
C/o Director – Design & Construction Department
2323 Texas Parkway
Missouri City, TX 77489

9.0 EVALUATION CRITERIA AND RELATIVE WEIGHTS

In accordance with Government Code Section 2269.056 the applicable weighted value for each criterion is published in the front pages of the CSP package.

9.1 Proposal Delivery and Organization

Offeror is to organize the Proposal in the following format:

- 1) To comply with Government code chapter 2269.059 your submittal must be sealed before delivery. Provide the requirements listed below in the order provided.
 - 1.1 Provide with the Proposal Base Bid Form (Submit in Bonfire Proposal Bid Form Section):
 - Addenda Acknowledgment Sheet
 - Bid Bond
 - Proposal Base Bid Form
 - 1.2 Provide the district and statute required forms in Bonfire Under Required Forms Section:
 - No Response Form(Optional)
 - Contractor Informational Form (Required)
 - Contractor Questionnaire (Required)
 - Bonding Capacity Certification Letter (Required)
 - Proposal Submission Form (Required)
 - Non-Collusion Certification (Required)
 - Certificate of Residency (Required)
 - Affidavit of Non-Discriminatory Employment (Required)
 - Contractor Certification (Required)
 - Felony Conviction Notification (Required)
 - Vendor Debarment Statement (Required)
 - Conflict of Interest Questionnaire (Required)
 - Certification regarding Lobbying (Required)
 - Confidential Copyrighted Information (Required)
 - Owner(s) Name of Business (Required)
 - Delinquent Taxpayers (Required)
 - Identification Number & Certification (Required)
 - Fort Bend ISD Contractor and Subcontractor Participation Form (Required)
 - Certificate of Interested Parties Form 1295 (Required)
 - Forms Certification (Required)
 - Per Govt. Code 2270.002, provide written verification that the company does not boycott Israel and will not during the term of the contract.
 - 1.3 For Proposals Formal Submission: Provide in Each Section in Bonfire as listed below. Provide information that details the evaluation response for each of the following criteria. Must be in the location specified in Bonfire.
 - Section ONE (**Offeror's Experience and Reputation**)

- Section TWO (**Quality of the Offeror's Goods and Services**)
 - Section THREE (**Offeror's Proposed Personnel**)
 - Section FOUR (**Other Relevant Factor- Plan and Schedule**)
- 1.5 **Financial Section** (Submit in Bonfire Offeror's Financial Section) "**Financial stability and bonding capacity**" (all financial information provided in Bonfire is confidential)
- 1.6 **Safety plan and safety record**" (Submit in Bonfire Safety Manual Section)
- 1.7 **Alternate Bid Proposal Submission** (Submit in Bonfire Package "B" Section)
- Alternate Bid Proposal Form
 - **Deviation Form (if Applicable)**
- 1.8 **SBEP commitment**" submission (Submit in Bonfire Package C Section)

9.2 Relative Weights

To determine the best value bidder, the Owner will evaluate the responses and information submitted on the Bid Form, Contractor's Information Statement Form and other bid documents in regards to the following criteria:

1) "The Price"

Texas Government Code 2269.055.a (1) The price.

- 1.1) Proposed construction contract price (base price plus alternates as defined on the bid form). Contract price shall include both base price and accepted alternate price as defined on the bid form. The final weighting distribution will be a calculated percentage.
- 1.2) **No deviations are allowed in the base bid or base bid adjustment. Any deviation from the Base Bid shall be submitted as Alternate No. 2 on the Deviations Form.**
- 1.3) **Evaluation of the proposed substitutes/deviations does not constitute Owner's acceptance of the substitutes/deviations but can be considered during negotiations.**
- 1.4) Price scores will be based on the base bid +/- the base bid adjustment which must be in adherence to all plans and specifications published.

2) "FORMAL SUBMISSION SECTION ONE – "Offeror's Experience and Reputation"

Texas Government Code 2269.055.a (2) The offeror's experience and reputation.

- 2.1) Provide three (3) letters of reference for projects completed in the past **one (1) year** from major suppliers and/or sub-contractors which specifically address the bidder's history of paying sub-contractors and material providers on time.
- 2.2) List current or past FBISD projects completed within the past **five (5) years** of similar scope and size.
- 2.3) List current or past projects with other school district completed within the **past five (5) years** of similar scope and size.
- 2.4) Letters of reference from Director of Facilities/Operations/Maintenance & from campus on housekeeping and cleanliness from FBISD and/or other school district
- 2.5) The district staff will contact the Owners, identified in the list of current or past K-12 projects or Non K-12 projects completed within the **past five (5) years** of similar scope and size. References

may be conducted by FBISD staff to ascertain the following:

- The quality of the work provided by bidder.
- The bidder's history of providing warranty documents.
- The bidder's history of timeliness in completing warranty work.
- The bidder's history of staying on schedule.
- The bidder's cooperative attitude when working with the owner and its architect in resolving construction issues.
- The bidder's history of providing detailed documentation and a fair assessment of change order pricing.
- The bidder's history of repeat business with owner(s).

- 2.6) Provide a detail of your history of on-time project completion. The district may verify the bidder's history based on references contacted by FBISD Administrative staff.
- 2.7) List all claims, judgments, arbitration proceedings or suits pending or outstanding against your company or its officers. Summarize the nature of the claims.

3) "FORMAL SUBMISSION SECTION TWO – Quality of the Offeror's Goods and Services"

Texas Government Code 2269.055.a (3) The offeror's experience and reputation

- 3.1) Include in the proposal; your firms' philosophy on construction management, your sub-contractor selection process, details of managing conflicts, staffing issues, subcontractor disputes. Include your plan for operating on an occupied school site. Include your system for coordination with local jurisdictions, your methodology for quality control. Provide a statement in your work flow plan that indicates scheduling and timing of site meeting, coordination with owners, documentation, and your firm's unique ability to satisfy the client. Include a project schedule/timeline with project specific parameters or limitations (e.g. evening, summer, holiday work).
- 3.2) Provide evidence of sufficient resources necessary to manage, staff and successfully perform the Work.
- 3.3) The bidder's history of on-time project success
- 3.4) Provide a sample quality management plan that would include your role in substantiating conformance with the contract documents. Include in the plan your performance history for: quality assurance/quality control, preconference processes, process for documenting and correcting nonconforming work, as well as the process and staff that would oversee this plan.
- 3.5) Provide cost saving ideas and associated cost.
- 3.6) Provide details of firms PMCS capabilities, include familiarity with major software packages, CAD coordination, and electronic filling, submissions, and transmittals.

4) Utilization of historically underutilized businesses

Texas Government Code 2269.055.a (4). Not Applicable

5) Offeror's Safety Record – "Safety plan and safety record"

Texas Government Code 2269.055.a (5) The offeror's safety record.

- 5.1 Provide your company's safety program manual. (see submission process in section A above)
- 5.2 Provide OSHA No. 300 Log information for the past three (3) years regarding following points:
 - 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)
- 5.3 Provide your company's safety orientation program for new employees.
- 5.4 State the frequency and provide evident of ongoing safety inspections as implemented in current projects.
- 5.5 Provide your company's drug/alcohol prevention policy.

6) "FORMAL SUBMISSION SECTION THREE – "Offeror's Proposed Personnel"

Texas Government Code 2269.055.a (6) The offeror's proposed personnel – Resumes, experience, certifications, past specific experience with similar scope.

- 6.1 List individuals and provide detailed resumes of the positions for Project Manager, Assistant Project Manager, Project Superintendent, Assistant Project Superintendent and MEP Quality Control Specialist who will be assigned for the entire duration of the Project. Resumes should address the following points for each of the positions mentioned above.
 - Amount of time assigned to project;
 - Years of experience;
 - Current project assignment and availability for this project
 - Relevant K-12 experience;
 - Certifications
 - Include project available dates for key staff

7) "Offeror's Financial Capability Appropriate to the Size and scope of the Project"

Texas Government Code 2269.055.a (7) whether the offeror's financial capability is appropriate to the size and scope of the project

- 7.1 Submit Bond on FBISD mandated form.
- 7.2 Provide your company's single limit coverage.

- 7.3 Provide your company's aggregate/total available limit of coverage.
- 7.4 List your surety company and address following points.
- Years your company has had a business relationship with surety;
 - AM Best Rating;
 - Identify if surety company is registered in the State of Texas.
- 7.5 List projects your company has in progress. For each project listed address the following points.
- Name of project;
 - Owner's contact person and phone number;
 - Architect, Architect's contact person and phone number;
 - Contract amount;
 - Percent complete;
 - Scheduled completion date;
 - List total worth of work in progress and under contract.
- 7.6 Provide a recent financial statement for the organization that is proposing.
- 7.7 The financial statement should be attested to by a CPA, an Audit is preferred, a Review is acceptable, or a Compilation at a minimum.
- AUDIT
- provides the highest level of assurance on an organization's financial statement
- REVIEW
- provides limited assurance on an organization's financial statements
- COMPILATION
- provides no assurance on an organization's financial statement
- 7.8 The Financial Statement must address the following points:
- Your organization's latest balance and income statement showing current assets, net fixed assets, other assets, current liabilities and other liabilities;
 - Indicate name and address of firm preparing financial statement, and date thereof;
 - If the financial statement is not for the identical organization submitting offer, explain the relationship and financial responsibility of the organization whose financial statement is provided (parent, subsidiary, etc.)
- 7.9 If available, please list your company's Dunn & Bradstreet risk rating.

8) “SUBMIT IN BONFIRE PACKAGE “C” – “SBEP commitment”

Texas Government Code 2269.055.b (2) Any other relevant factor specifically listed in the request for bids or proposals.

8.0 Provide your Small Business Enterprise Program Proposal packet.

8.1 Small Business Enterprise Program

8.1.1 Owner has adopted a Small Business Enterprise Program to provide increased business opportunities for locally certified small businesses to competitively participate in contracting and procurement within FBISD. See FBISD Board Policy CV(Local), and the FBISD Small Business Enterprise Program.

8.1.2 Small Business Practices:

8.1.2.1 Describe your previous experience, involvement and approach in working with certified Small Business firms; including level of effort, division of duties and providing opinions. Provide a statement detailing small business participation commitment.

8.1.2.2 For this Project FBISD has a small business participation goal of Twenty-Five Percent (25%).

8.1.2.3 At a minimum, your response must include: (a) Firm’s commitment to meeting the small business participation goal for the project (b) a description of previous projects where your firm has successfully subcontracted work to small businesses including the percentage (%) of work subcontracted to these firms under each project; (c) a narrative outlining your overall approach to subcontracting and how you will solicit small businesses for participation as part of this Project; and (d) indicate what challenges you anticipate in attaining FBISD’s goal.

8.1.2.4 Describe your company’s process for the selection of subcontractors in accordance with the statutory procedures required for the solicitation of subcontractors under a Construction Manager-at-Risk delivery method, including your process for evaluating subcontractors’ performance while also incorporating a Small Business Development Program.

8.1.2.5 Provide a reference list of all customers noted in Past Performance References that included a Small Business or similar program where you have performed work similar to the type of work described in this CSP. Provide the contact person and the representative who served as the Small Business Development liaison, telephone number and email address.

8.1.2.6 If, in the opinion of the Evaluation Committee, the Proposal Response completely meets the stated small business participation goals, the total amount of eligible points will be awarded for small business participation, as indicated below.

Proposed SBE Subcontracting	Available Points
Less than 5%	0
5% - 9%	1
10% - 14%	2
15% - 19%	3
20% - 24%	4
25% or more	5

8.1.3 Points shall be awarded in accordance with the Proposal Response based on the prime vendor’s commitment to small business subcontracting stated in the solicitation document and the published point distribution sliding scale.

8.1.4 If the proposer itself is a certified Small Business who plans to self-perform work, the value of such self-performed work shall be included in calculating the eligible points for small business participation to the Small Business Proposer, in addition to the value of work subcontracted to another small business.

8.1.5 If the proposer itself is not a certified Small Business, but has join-ventured with another certified Small Business, only the value of work to be self-performed by the certified Small Business Prime contractor will be included in calculating the eligible points for small business

- participation to the Small Business Proposer/joint venture, in addition to the value of work subcontracted to another small business.
- 8.1.6 Once selected, all prime construction contractors ("Contractor") working with FBISD on SBEP eligible construction projects shall be required to submit the Fort Bend ISD Subcontractor Progress Assessment Form with each application for payment, requesting payment be made for Work performed by a subcontractor that qualifies as a "small business" under FBISD Board Policy CV (Local). The Contractor shall also ensure that, once Contractor makes the applicable payment to the Small Business Subcontractor, the Subcontractor completes the Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form in its entirety. Contractor agrees to submit the completed copies to Owner with the next application for payment. The completed Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form must be received by the Owner before any further payment will be made to Contractor for any Work performed.
- 8.1.7 Include with your submission the SBEP Participation Report
- 8.1.8 Include with your submission the Supplier Diversity Questionnaire

9.0 Award of the Contract

- 1.1 The Bidder to whom the award is made will be promptly notified. If a Bidder (a) withdraws his bid within 45 days after the date of time fixed for the opening of bids in the Request for Competitive Sealed Bids, or (b) fails or refuses to execute the Agreement, or other required forms within ten (10) calendar days after the same are presented to him for signature, or (c) fails or refuses to furnish properly executed Performance Bond and Certification of Required Insurance within 10 calendar days of Notice of Award of the Project, the Owner may award the work to another Bidder or Bidders or, if applicable, may call for new bids.
- 2.2 The Bidder will be required to (a) submit his bid and Bid Bond, (b) execute Contract and Performance and Payment Bonds, and (c) submit Certification of required insurances.
- 1.3 Bid Bond is forfeited if bid is withdrawn after the CSP opening, or Contract Documents are not executed in accordance with the above.

10.0 SUBMISSION OF POST COMPETITIVE SEALED COMPETITIVE INFORMATION

The selected Bidder shall within ten (10) days after the Board of Trustees approves the award submit the following:

- 10.1 A designation of the work to be performed by the Bidder with his own forces.
- 10.2 An experience profile of the selected Bidder's superintendent scheduled to work on this project. In addition, the apparent selected Bidder shall cooperate with the Owner, supplying requested information to substantiate the qualifications of the superintendent. If, in the opinion of the Owner, the superintendent does not qualify, the Owner may request the submission of another superintendent and more information. The Owner reserves the right to reject the apparent selected Bidder if an acceptable superintendent is not presented.
- 10.3 A list of names of subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for such portions of the work as may be designated in the bid documents or, if no portions are so designated, the names of the subcontractors proposed for the principal portions of the work.
- 10.4 The selected Bidder shall within ten (10) days thereafter submit a statement of costs for each major item of work included in the bid. Each section of specifications will be considered a major item of work and shall be shown as a separate cost item.

11.0 NOTICE TO PROCEED

- 11.1 The Bidder shall not commence work under this Contract until he receives the written Notice to Proceed and the Contract is duly signed by the Owner.

12.0 COMPLETION TIME

- 12.1 The Owner has a critical need for the work to begin timely and be Substantially Complete by date provided on the Bid Form.
 - 12.2 Having thoroughly familiarized himself with the conditions as they exist at the building sites and acquainted himself with the labor supply and the material market, the Bidder will state in his bid that he agrees to be substantially complete with the work by the date above.
 - 12.3 Under the Base Bid, the successful Bidder will be subject to liquidated damages.
 - 12.4 The definition of Substantial Completion, as defined in Article 9.8.1 of the AIA General Conditions and Supplementary Conditions bound herein, is as follows: "Substantial Completion is the stage in the progress of 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".
- 13.0 RETAINAGE**
- 13.1 Contracts will bear a retainage of five (5) percent (%) on each partial disbursement.

14.0 ASBESTOS, LEAD AND PCBs CONTAINING MATERIALS

- 14.1** The use of any construction process or the installation of any asbestos, lead and PCBs or material containing asbestos, lead and PCBs is strictly prohibited for this Project.
- 14.2** Prior to submitting a bid, Bidders shall notify the Project Manager, in writing, of any materials in these specifications which are known to contain or are likely to contain asbestos, lead or PCBs.
- 14.3** Prior to payment of retainage and final payment the Contractor shall furnish a notarized statement certifying that no asbestos, lead and PCBs containing materials have been used in the Project.
- 14.4** In addition to the Contractor's notarized statement, the Subcontractors will be required to furnish notarized affidavits that no asbestos, lead, and PCBs containing products have been used in this Project.

15.0 AVAILABILITY OF MATERIALS AND SYSTEMS

- 15.1** A serious effort has been made to select only materials that are asbestos free and systems that are readily available. As far as is known at bid time all items are either available "off the shelf" or within a relatively short period of time. If during the bid period, an Bidder becomes aware of an availability or delivery problem with any of the specified systems or materials or if they contain asbestos, he should notify the Project Manager immediately. The Project Manager will promptly explore possibilities for selecting other systems or materials which would circumvent the problem and notify Bidders of any changes in an addendum, otherwise it will be understood that only specified systems and materials that are asbestos free are included in the bids.

16.0 USE OF ASBESTOS FREE MATERIALS, PRODUCTS AND SYSTEMS

- 16.1** The Contractor is reminded to refer to the Section above for requirements during the bid period and the following requirements during performance of the Work regarding the use of asbestos free materials, products and systems in the Project.
- 16.2** Since many materials, products and systems are proprietary, it is not possible to know all of the materials or components which go into producing such material, product or system without the manufacturer divulging trade secrets or patent information. Every effort has been made to specify materials, products or systems, which either as an "off the shelf" material, product or system or as a custom material, product or system do not contain asbestos.
- 16.3** It is the Contractor's responsibility to submit an affidavit from the manufacturer to ascertain that every material, product or system used in the Project does not contain asbestos. In the event the material, product or system is found to contain asbestos, the Contractor shall offer for the Project Manager's consideration a substitution which he knows does not contain asbestos.
- 16.4** Even though a material, product or system is specified or a specification is based on a particular material, product or system, the Contractor will not be relieved from the responsibility to ascertain that materials, products and systems used in the Project do not contain asbestos. Under no circumstances shall a material, product or system which is known, suspected or found to contain asbestos be used on the project.
- 16.5** If a material, product or system containing asbestos is used, the Contractor shall remove and replace the material, product or system with one which is asbestos free at no additional expense to the Owner, including removal and replacement of other materials affected by the removal of the asbestos bearing material, product or system, i.e. gypsum wallboard removed, replaced, and repainted on account of insulation being removed, etc

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Clarification for **Package B** of Fort Bend ISD CSP

Package A – Base Bid and All Documents EXCEPT Alternates and SBE Documents

Package A should include the contractor's base bid for the project on the Base Bid Form

Package B – Alternates and Base Bid Adjustment (correction)

Package B should include the following on the Alternate Form:

- The bidder's **alternate bids** as requested by the District. If a bidder does not submit alternate pricing, they will be disqualified as a non-responsive bidder.
- The bidder's **base bid adjustment** to their original base bid submitted in Package A.
- **Deviations** should not be included in the base bid or base bid adjustment.

Bidder should enter the amount the District may ADD to or DEDUCT from their base bid submitted in Package A. For example, if the bidder submitted a base bid in Package A as \$10,000,000 but realized they should have submitted the base bid as \$10,500,000, then the bidder would insert an ADD in the Base Bid Adjustment line as \$500,000.

The **Purchasing Department** will calculate Base Bid (Package A) plus/minus Base Bid Adjustment (Package B) to obtain the FINAL Base Bid for the CSP.

- No deviations are allowed in the base bid or base bid adjustment. Any deviation from the Base
- Bid shall be submitted as Alternate No. 2 on the Deviations Form. Evaluation of the proposed substitutes/deviations does not constitute Owner's acceptance of the substitutes/deviations but can be considered during negotiations

Form Instructions:

Add: Provides the amount Purchasing should add to the original base bid reflected in Package A

Deduct: Provides the amount Purchasing should deduct from the original base bid reflected in Package A

No change: Means that there is no change to your base bid price reflected in Package A

Not Applicable (NA): Means that there is no change to your base bid price reflected in Package A

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DEVIATION REQUEST FORM

Instructions to Bidders: No deviations are allowed in the Base Bid or Base Bid Adjustment. Deviations shall be submitted on the Deviations Form as Alternate 2. Complete this form, attach any supporting data and submit with Package B.

Project Title and Number:		
Deviation Request No.	Date Submitted:	Specification Section, and/or Drawing No:
Item Description:		
Reason for Deviation: <i>(If specified product, material or detail cannot be provided, include statement indicating why and provide supporting information.):</i>		
Differences (point-by-point comparative data) between proposed deviation and specified product, material or detail:		

Proposed deviation affects other parts of the project :

☐

YES

☐

NO

Explain:

Time Impact due to Deviation:

☐

YES

☐

NO

☐

ADD

☐

DEDUCT

Days

Anticipated deviation savings and/or benefit to the District:

\$ _____

Date:

Printed Name of Authorized Representative:

Signature of Authorized Representative:

A/E Recommendation:

Deviation Request approved to proceed with deviation:

Deviation Request rejected:
Use specified product

Notes:

Date:

Additional Information if Applicable

Reason for Deviation: *(If specified product, material or detail cannot be provided, include statement indicating why and provide supporting information.)*

Differences (point-by-point comparative data) between proposed deviation and specified product, material or detail:

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DOCUMENT 00 31 00

AVAILABLE PROJECT INFORMATION

1.1 AVAILABLE INFORMATION, GENERAL

- A. Informational Documents: The Owner is making certain documents available for Bidders' information. The Owner does not warrant the accuracy of the information contained with these documents. Bidders are encouraged to verify conditions prior to submitting their bid.
 - 1. Informational documents and reports are provided for convenience and are intended as information only. These documents are not a part of the proposed Contract Documents.
 - 2. The Owner and Architect assume no liability for the use of or interpretation of data from supplementary documents and reports provided for Bidders' information.
- B. Copies of informational documents are available for viewing as appended to this Document.

1.2 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. An Asbestos Survey has been prepared by the Owner's hazardous materials consultant and is made available for Bidders' information and convenience.
- B. There is a potential that asbestos or other hazardous materials may exist where demolition or cutting and patching work is scheduled to occur. If suspected hazardous materials are encountered or uncovered, immediately stop work in the area, protect persons from exposure, and notify the Owner and Architect immediately.
- C. If the suspect substance is found to be asbestos or other hazardous material, the Owner will arrange for removal or perform abatement under a separate contract. Do not resume work in the area until abatement is complete and authorization to proceed has been received. Work may continue in areas that are not affected by hazardous materials or abatement operations.
- D. Hazardous materials abatement is specifically excluded from the Work of the Contract.

1.3 ATTACHMENTS

- A. Attachment A: Package "A" Base Bid Proposal Form – CSP Stipulated Sum.
- B. Attachment B: Package "B" Base Bid Proposal Form – CSP Stipulated Sum.
- C. Attachment C: Asbestos Operations and Maintenance Program (Hodges Bend MS)
- D. Attachment D: Certificate of Asbestos Free Construction (Austin HS)

- E. Attachment E: Asbestos Free Guarantee (Bowie MS)
- F. Attachment F: Certificate of Asbestos-Free Construction (Crockett MS)
- G. Attachment G: Certificate of Asbestos-Free Construction (Garcia MS)
- H. Attachment H: SHW Group LLP Letter (Travis HS)
- I. Attachment I: Marshall Construction Company Letter (Walker Station ES)

END OF DOCUMENT



SECTION AC
PACKAGE “A” BASE BID PROPOSAL FORM – CSP STIPULATED SUM

CSP No: CSP 26-036KB **BP 048 - BP Name:** HVAC MEP West Zone 3

FORT BEND INDEPENDENT SCHOOL DISTRICT

Submitted by: _____

Date: _____ Phone Number: _____

Vendors are required to respond to all requests identified in the Solicitation and indicate their acceptance or objection to the terms of the Solicitation and these General Provisions must be clearly indicated in Vendor’s Solicitation Response. No-bid is deemed non-responsive by FBISD.

Having examined Proposal and Contract Documents prepared by Fort Bend ISD and Corgan Associates, Inc. dated 12/18/2025 and having examined site conditions, the undersigned proposes to furnish all labor, equipment and materials and perform all work for the completion of the above-named project for the sum indicated below.

- I. DESCRIPTION:** Repairs and upgrades to the mechanical, electrical, and plumbing systems within existing middle schools and high schools across multiple campuses (BP048).

Undersigned agrees to complete the work for the lump sum amounts of:

_____ Dollars
(Amount written in words governs)

\$ _____
(Amount in figures)

II. PROJECT TIMELINES

The District anticipates that this project will take 456 calendar days to complete. Contractor agrees the work will be substantially completed within 456 calendar days from executed contract and issuance of Notice to Proceed.

Should the Contractor anticipate **lower** calendar days to complete this project, please indicate below. The District will consider contractor proposed lower calendar days and incorporate into contract if deemed appropriate.

CONTRACTOR’S PROPOSED DAYS TO COMPLETE BP 048_____

III. LIQUIDATED DAMAGES:

The undersigned understands that liquidated damages as defined in the Supplementary Conditions will be included in the form of Agreement Between Owner and Contractor and that the contractor will be bound thereto.

Contractor accepts the provisions of the Contract as to liquidated damages in the event of failure to complete the work on time. Liquidated damages shall be the sum of **\$1,000.00** per day for each calendar day that Substantial Completion is delayed for each project.

Further, the Contractor acknowledges that additional liquidated damages in the sum of **\$250.00** per day for each calendar day shall be imposed for non-completion of punch list items and contract close-out within sixty (60) calendar days after Substantial Completion.

IV. ALLOWANCES:

Allowances are to be included in the Contractor's base bid for each project in the following amounts:

- A. \$0 N/A
- B. \$0 N/A

Contractor should include allowance and markup in the base bid. Section 3.8 of the Supplementary Conditions defines the procedures for markups.

V. UNIT PRICES – BASE BID

UNIT PRICES – Provide Unit Pricing for each of the following (refer to specifications)

- 01 ☐ HVAC Piping– (All Sizes) 1", 1.5", 2", 2.5", 3", 3.5", 4", 6" _____ add unit
- 02 ☐ HVAC Piping Insulation All sizes (1", 1.5", 2", 2.5", 3", 3.5", 4", 6") Chilled Water, heating Water, and Refrigerant Lines _____ add unit
- 03 ☐ DCW and DHW Lines (All Sizes) (3/4", 1", 1.5", 2", 2.5", 3", 3.5", 4") _____ add unit
- 04 ☐ DCW/DHW Insulation (All Sizes) (3/4", 1", 1.5", 2", 2.5", 3", 3.5", 4") _____ add unit
- 05 ☐ Ductwork Insulation _____ add unit

VI. CHANGES IN THE WORK

The undersigned understands that changes in the work shall be performed in accordance with the Supplementary Conditions.

VII. PROPOSAL EVALUATION WAIVER

By submitting a Proposal, the proposer indicated below agrees to waive any claim it has or may have against the Owner, Architect, Engineers, Consultants and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any proposal. The proposer further agrees the Owner reserves the right to waive any requirements under the proposal documents or the Contract Documents, acceptance or rejection of any proposals, and recommendation or award of the contract.

It is understood that the right is reserved by the Owner to reject any or all proposals, or waive any informalities in Receipt of Proposals.

The undersigned certifies that the amounts contained in this Competitive Sealed Proposal have been carefully checked and are submitted as correct and final; and additionally, agrees to comply with all provisions of the Proposal Form.

The undersigned CONTRACTOR proposes and agrees, if this Proposal is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to complete all work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Proposal and in accordance with the Contract Documents.

CONTRACTOR accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Proposal Security. This Proposal will remain open for sixty (60) days after the day of Proposal opening. CONTRACTOR will sign the Agreement and submit the Contract Security and other documents required by the Contract documents within ten (10) calendar days after the date of the OWNER'S Notice of Award.

In submitting this Proposal, CONTRACTOR represents, as more fully set forth in the Agreement, that:

- (a) Contractor has examined copies of all the Contract Documents and of the following addenda, receipt of which is hereby acknowledged, and also copies of the Advertisement or Invitation to Submit Proposal.

_____ ADD-01 dated _____	Total # pgs _____	ADD-02 dated _____	Total # pgs _____
_____ ADD-03 dated _____	Total # pgs _____	ADD-04 dated _____	Total # pgs _____
_____ ADD-05 dated _____	Total # pgs _____	ADD-06 dated _____	Total # pgs _____
_____ ADD-07 dated _____	Total # pgs _____	ADD-08 dated _____	Total # pgs _____

- (b) CONTRACTOR has examined the site and locality where the work is to be performed, the legal requirements (federal, state and local laws, ordinances, rules and regulations) and the conditions effecting cost, progress or performance of the work and has made such independent investigations as CONTRACTOR deems necessary.
- (c) This PROPOSAL is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; CONTRACTOR has not directly or indirectly induced or solicited any other Contractor to submit a false or sham Proposal; CONTRACTOR has not solicited or induced any person, firm or a corporation to refrain from submitting a proposal; and CONTRACTOR has not sought by collusion to obtain for himself any advantage over any other Contractor or over OWNER.

Type of Proposer's Organization:

(Corporation, Co-Partnership, Individual, etc.)



Proposer: _____ (Print or Type)

Signature of Proposer

Title of Office: _____ (Print or Type)

Legal Address: _____ (Print or Type)

Zip Code: _____ Tel:(_____) _____ (Print or Type)

ATTEST:

(Secretary, if Proposer is a Corporation)

SEAL:
(If Corporation)



SECTION AC
PACKAGE “B” ALTERNATE BID PROPOSAL FORM – CSP STIPULATED SUM

CSP No: 26-036KB **BP 048** **BP Name:** HVAC MEP West Zone 3

FORT BEND INDEPENDENT SCHOOL DISTRICT

Submitted by: _____

Date: _____ Phone Number: _____

Vendors are required to respond to all requests identified in the Solicitation and indicate their acceptance or objection to the terms of the Solicitation and these General Provisions must be clearly indicated in Vendor’s Solicitation Response. No-bid is deemed non-responsive by FBISD.

Having examined Proposal and Contract Documents prepared by Fort Bend ISD and Corgan Associates, Inc. dated December 18th, 2025 and having examined site conditions, the undersigned proposes to furnish all labor, equipment and materials and perform all work for the completion of the above-named project for the sum indicated below.

- I. DESCRIPTION:** Repairs and upgrades to the mechanical, electrical, and plumbing systems within existing middle schools and high schools across multiple campuses (BP048).

Undersigned agrees to complete the work for the lump sum amounts of:

_____ Dollars
(Amount written in words governs)

\$ _____
(Amount in figures)

- II. PROJECT TIMELINES – Refer to Section V. for the construction calendar days associated with alternates.**

The District anticipates that this project will take 456 calendar days to complete. Contractor agrees the work will be substantially completed within 456 calendar days from executed contract and issuance of Notice to Proceed.

Should the Contractor anticipate **lower** calendar days to complete this project, please indicate below. The District will consider contractor proposed lower calendar days and incorporate into contract if deemed appropriate.

CONTRACTOR’S PROPOSED DAYS TO COMPLETE

BP 048 _____ Base Proposal

BP 048 _____ Alternates
 BP 048 _____ Base Proposal and Alternates
 (Enter only if LOWER than District's proposed time)

III. LIQUIDATED DAMAGES:

The undersigned understands that liquidated damages as defined in the Supplementary Conditions will be included in the form of Agreement Between Owner and Contractor and that the contractor will be bound thereto.

Contractor accepts the provisions of the Contract as to liquidated damages in the event of failure to complete the work on time. Liquidated damages shall be the sum of **\$1,000.00** per day for each calendar day that Substantial Completion is delayed for each project.

Further, the Contractor acknowledges that additional liquidated damages in the sum of **\$250.00** per day for each calendar day shall be imposed for non-completion of punch list items and contract close-out within sixty (60) calendar days after Substantial Completion.

IV. ALLOWANCES:

Allowances are to be included in the Contractor's base bid for each project in the following amounts:

- A. \$0 .N/A
- B. \$0 .N/A

Contractor should include allowance and markup in the base bid. Section 3.8 of the Supplementary Conditions defines the procedures for markups.

V. ALTERNATES

Refer to Division 01 23 00 for administrative and procedural requirements of Alternates.

Alternate No. 1 Base Bid Adjustment

The undersigned agrees to complete all base bid work and adjust the final base bid lump sum amount as follows:

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐
2. _____ Dollars
 (Amount written in words governs)
 \$ _____
 Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

Alternate No. 2 Deviations Request Form

If Bidder proposes to use any substitution or deviations from the base bid use Alternate No. 2 via the Deviations Form in section 00 21 13 Instructions to Bidders. If the owner elects to proceed with Alternate No. 2, the undersigned agrees to complete the ADDITIVE work for the lump sum amount of:

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐
2. _____ Dollars
(Amount written in words governs)
\$ _____
Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

Alternate No. 3 Austin HS - Additional AHUs (refer to specification section 01 23 00)

If the owner elects to proceed with Alternate No. 3 the undersigned agrees to complete the ADDITIVE work for the lump sum amounts of:

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐
2. _____ Dollars
(Amount written in words governs)
\$ _____
Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

Alternate No. 4 Austin HS - Additional AHUs (refer to specification section 01 23 00)

If the owner elects to proceed with Alternate No. 4 the undersigned agrees to complete the ADDITIVE work for the lump sum amounts of:

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐
- _____ Dollars
(Amount written in words governs)
\$ _____
Amount written in figures
2. Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

VI. UNIT PRICES – ALTERNATE BID

UNIT PRICES –

01	☐ HVAC Piping– (All Sizes) 1", 1.5", 2", 2.5", 3", 3.5", 4", 6" _____	<u>add unit</u>
02	☐ HVAC Piping Insulation All sizes (1", 1.5", 2", 2.5", 3", 3.5", 4", 6") Chilled Water, heating Water, and Refrigerant Lines _____	<u>add unit</u>
03	☐ Domestic CW and HW Lines (All Sizes) (3/4", 1", 1.5", 2", 2.5", 3", 3.5", 4") _____	<u>add unit</u>
04	☐ Domestic CW and HW Insulation (All Sizes) (3/4", 1", 1.5", 2", 2.5", 3", 3.5", 4") _____	<u>add unit</u>
05	☐ Ductwork Insulation _____	<u>add unit</u>

VII. CHANGES IN THE WORK

The undersigned understands that changes in the work shall be performed in accordance with the Supplementary Conditions.

VIII. PROPOSAL EVALUATION WAIVER

By submitting a Proposal, the proposer indicated below agrees to waive any claim it has or may have against the Owner, Architect, Engineers, Consultants and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any proposal. The proposer further agrees the Owner reserves the right to waive any requirements under the proposal documents or the Contract Documents, acceptance or rejection of any proposals, and recommendation or award of the contract.

It is understood that the right is reserved by the Owner to reject any or all proposals, or waive any informalities in Receipt of Proposals.

The undersigned certifies that the amounts contained in this Competitive Sealed Proposal have been carefully checked and are submitted as correct and final; and additionally, agrees to comply with all provisions of the Proposal Form.

The undersigned CONTRACTOR proposes and agrees, if this Proposal is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to complete all work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Proposal and in accordance with the Contract Documents.

CONTRACTOR accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Proposal Security. This Proposal will remain open for sixty (60) days after the day of Proposal opening. CONTRACTOR will sign the Agreement and submit the Contract Security and other documents required by the Contract documents within ten (10) calendar days after the date of the OWNER'S Notice of Award.

In submitting this Proposal, CONTRACTOR represents, as more fully set forth in the Agreement, that:

- (a) Contractor has examined copies of all the Contract Documents and of the following addenda, receipt of which is hereby acknowledged, and also copies of the Advertisement or Invitation to Submit Proposal.

_____ ADD-01 dated _____	Total # pgs _____	ADD-02 dated _____	Total # pgs _____
_____ ADD-03 dated _____	Total # pgs _____	ADD-04 dated _____	Total # pgs _____
_____ ADD-05 dated _____	Total # pgs _____	ADD-06 dated _____	Total # pgs _____
_____ ADD-07 dated _____	Total # pgs _____	ADD-08 dated _____	Total # pgs _____

- (b) CONTRACTOR has examined the site and locality where the work is to be performed, the legal requirements (federal, state and local laws, ordinances, rules and regulations) and the conditions effecting cost, progress or performance of the work and has made such independent investigations as CONTRACTOR deems necessary.
- (c) This PROPOSAL is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; CONTRACTOR has not directly or indirectly induced or solicited any other Contractor to submit a false or sham Proposal; CONTRACTOR has not solicited or induced any person, firm or a corporation to refrain from submitting a proposal; and CONTRACTOR has not sought by collusion to obtain for himself any advantage over any other Contractor or over OWNER.

Type of Proposer's Organization:

(Corporation, Co-Partnership, Individual, etc.)

Proposer: _____
(Print or Type)

Signature of Proposer

Title of Office: _____
(Print or Type)

Legal Address: _____
(Print or Type)

Zip Code: _____ Tel: (_____) _____
(Print or Type)

ATTEST:

(Secretary, if Proposer is a Corporation)

SEAL:
(If Corporation)

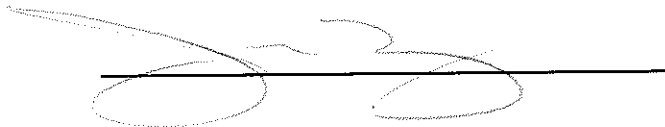
**ASBESTOS OPERATIONS AND
MAINTENANCE PROGRAM
FOR
FORT BEND ISD
HODGES BEND MIDDLE SCHOOL
16510 BISSONNET
SUGAR LAND, TEXAS 77083**

JANUARY 15, 2002

PREPARED BY:

Dolphin Environmental Consultants
10707 Corporate Drive
Suite #102
Stafford, Texas 77477

Joseph Bury- Dolphin Environmental Consultants
Texas Department of Health Licensed
"Individual Asbestos Consultant" #10-5005 Expires 12/02/02

A handwritten signature in dark ink, appearing to read 'Joseph Bury', is written over a horizontal line.

Texas Department of Health Licensed "Asbestos Consultant Agency" #10-0001

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I. INTRODUCTION

On October 22, 1986, Congress promulgated the Asbestos Hazard Emergency Response Act (AHERA), Public Law 99-519. AHERA mandated the EPA develop regulations to respond to asbestos in schools. On October 30, 1987 the EPA promulgated the Asbestos Containing Materials in Schools Rule (referred to as the AHERA Rule), 40CFR, Part 763, Subpart E. This rule requires that all nonprofit elementary schools and secondary school, both public and private, inspect their school buildings for asbestos containing building materials (ACBM), develop a plan to manage the asbestos for each building, notify parents and staff regarding management plan availability and provide awareness training to maintenance and custodial workers.

Certainly the most effective way of managing an asbestos problem is to completely remove all asbestos containing material (ACM) from the building, thus removing the problem in its entirety. In most cases, however, this wholesale removal is not economically feasible or even desirable from a building usage standpoint. When asbestos containing material cannot be completely removed, a comprehensive Operations and Maintenance Program, as required by 40 CFR 763.91, will allow the building owner to control the asbestos problem until removal of the material is feasible or necessary. The EPA has specific policies governing the managing of asbestos containing materials found in buildings and these would be outlined in the Operations and Maintenance Program.

A. DEFINITIONS

Several definitions pertinent to an Operations and Maintenance Program are identified in 40 CFR 763.83. They are as follows:

Asbestos Containing Material (ACM), when referring to buildings, this means any material, which contains more than one percent (1%) asbestos.

Asbestos Containing Building Material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM, that is found in or on interior structural members or other parts of a building.

Asbestos Debris means pieces of ACBM that can be identified by color, texture, or composition; or means dust, if the dust is determined by an accredited inspector to be ACM.

Operations and Maintenance Program means a program of work practices to maintain friable and non friable ACBM in good condition, to ensure cleanup of asbestos fibers previously released, and to prevent further release by minimizing and controlling damage to friable ACBM.

Fiber Release Episodes means any uncontrolled or unintentional disturbances of ACBM resulting in visible emissions.

Friable, when referring to material in a building, means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and

includes previously non-friable material after such previously non-friable material becomes damaged to the extent that, when dry, it may be crumbled, pulverized, or reduced to powder by hand pressure.

High Efficiency Particulate Air (HEPA) is a filtering system capable of trapping and retaining at least 99.97% of all non dispersed particles 0.3 millimeters in diameter or larger.

Homogeneous Area means an area of surfacing material, thermal system insulation, or miscellaneous material that is uniform in color and texture.

Removal means the taking out or the stripping of substantially all ACBM from a damaged area, functional space, or homogeneous area in a building.

Repair means returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.

Response Action means a method, including removal, encapsulation, enclosure, repair, operations and maintenance that protects human health and the environment from friable ACBM.

Routine Maintenance Area is an area, such as a boiler room or mechanical room, that is not normally frequented by occupants and in which maintenance employees or contract workers regularly conduct maintenance activities.

B. DESIGNATED PERSON RESPONSIBILITIES

Fort Bend ISD has appointed a Designated Person. The name and address of the designated person is found in the Appendix of this O&M program. This person should be knowledgeable of the amount, location, and hazards of the ACM on the property. **The Designated Person's primary responsibility is to insure that no disturbance of the identified materials is done without confirmation of the asbestos content of the materials by inspection and analysis.** The Designated Person's additional responsibilities should include, but not be limited to:

1. The Designated Person should have a good understanding of the extent of the ACM contamination and the costs associated with the removal or repair. The Designated Person should be capable of establishing contracts with the appropriate technical experts or health professionals so that removal or repair minimizes exposures and complies with the existing state, federal, and local requirements.
2. The Designated Person should be capable of training or contract for training for all personnel who are involved with the management of ACM, which has been identified to be managed under this Program.

3. The Designated Person should be capable of identifying, labeling, and periodically evaluating the potential asbestos hazards.
4. The Designated Person should be capable of prioritizing abatement efforts and implementing programs, which will contain long and short-term programs.
5. The Designated Person should be capable of evaluating all options of ACM control and arrange for the proper abatement by a qualified contractor when deemed necessary.
6. The Designated Person should be capable of identifying all employees who should be included in a medical surveillance and respirator protection program.
7. The Designated Person should implement a record keeping system to document, verify, and report all activities associated with possible ACM exposure.
8. The Designated Person must have as a minimum, a two-hour asbestos awareness training course.

C. PROGRAM PHILOSOPHY

The Operations and Maintenance (O & M) Program for Fort Bend ISD is designed to avoid exposures to asbestos containing material (ACM) that has been identified during an inspection of the facility.

The objective of the Program is to minimize access and exposure to all known ACM at the project by informing all affected personnel (e.g. students, faculty, management, maintenance, trade contractors, etc.) of its location, and instructing them to report any damage to the ACM they observe.

There is a possibility of contact or disturbance through normal maintenance activity. Document inspection of all ACM at least twice a year for damage and/or deterioration (additional inspections should be performed following any catastrophe, e.g. fire).

II. NOTIFICATION

A. SUMMARY OF INSPECTION

This O & M Program is based on an inspection conducted on January 9, 2001 by Jeffrey L. Hilburn, TDH Licensed Asbestos Inspector and EPA Accredited Asbestos Inspector. The inspection report is included in the Appendix of the O & M Plan. The following ACBM was identified.

Friable Asbestos Materials

Non-Friable Asbestos Materials

Floor Tile

See the inspection report for detail of the materials and location

B. RECOMMENDED RESPONSE ACTIONS

These will be managed under an O&M program until replacement or renovation requires their removal.

C. NOTICE TO OCCUPANTS

Fort Bend ISD must provide an annual *written* notification to students, guardians, faculty and employees about the location and physical condition of the ACM, the availability of the asbestos management plan and recent and upcoming asbestos activities such as abatement projects, re-inspections etc. An example of a notification can be found in the appendix of this O & M Plan.

D. EMERGENCY RESPONSE

In the event of the occurrence of an asbestos-related emergency, i.e.: major fiber release, at Fort Bend ISD the following procedures will be employed:

1. Immediately upon notice of the emergency, the party involved will vacate the area of involvement and immediately contact the Designated Person and/or their designee at the facility.
2. If the person(s) observing the incident is trained to handle ACM activities, that person(s) will take action to immediately isolate the area of involvement from the rest of the building by evacuating any unnecessary personnel from the area, turning off or isolating all air-moving equipment in the area, isolating the

area by closing off all entryways, and posting warning signs indicating the presence of a hazardous area.

3. The Designated Person or their designee will contact a Texas Department of Health licensed abatement contractor to clean up the incident. At this time either the contractor or the Fort Bend ISD must notify the Texas of Health on the TDH notification form of the activity (a copy is found in the Appendix). Under normal circumstances this notification must be made ten working days before the work can be done. In the event of an emergency, the local office of the TDH must be contacted via telephone (713-767-3258) to obtain permission to conduct the operation on an emergency basis. After the permission is obtained, the notification form must be submitted to the Texas Department of Health with the emergency number supplied by the local TDH office when permission for the emergency was granted. In the event the emergency occurs during non-business hours, the work can be performed and the notifications made on the next business day.
4. If the person(s) observing the incident is not trained to handle ACM activities, that person will immediately contact a member of the staff who has the appropriate training and alert that person to the problem. The trained staff member will then proceed to take the actions indicated.
5. If the occurrence is of such a size that a response action must be designated by a licensed designer, i.e. involving greater than 160 s.f., 260 l.f., or 35 c.f. of asbestos containing material, no further work will be done and the areas will remain isolated until the appropriate repair/maintenance activity will commence.
6. Following completion of the repair/maintenance activities, the appropriate forms will be completed. These forms will become part of the permanent Operations and Maintenance records.

E. NOTICE TO EMPLOYEES

The Designated Person must prepare notice or statement concerning the presence of asbestos-containing materials to distribute and have all employees acknowledge receipt of the statement. This acknowledgement is not designed to be a waiver or subrogation of employee's rights under the law, but rather as an acknowledgment that the employee has been informed of the presence of ACM and its location and condition. A copy of this type of statement and acknowledgement can be found an attachment "A" in the Appendix.

F. SUBMITTALS FROM OUTSIDE CONTRACTORS

Should the nature of maintenance, repair, or emergency activities require that an outside asbestos abatement contractor be called in to perform the work, the Designated Person should contract with a Licensed Asbestos Consulting Agency to insure compliance with regulatory agencies. If the work is done without the assistance of a consultant, the Designated Person should require, at a minimum, the following notices or proof from the contractor:

1. Notification to Texas Department of Health (TDH) on the current TDH form, a copy of which is found in the Appendix as Attachment "B".
2. Proof that the contractor's workers are accredited, certified, or licensed and that they are properly trained.
3. Copies of respiratory protection, medical surveillance, and worker training documentation as required by OSHA, EPA, and/or State regulatory agencies.
4. Notification to building occupants and visitors that abatement activity is underway.
5. Assurance that the contractor will use proper work practices and work area isolation techniques, proper equipment, and sound waste disposal activities.
6. Provisions for inspection of the area by the owner's representative to ensure that the area is acceptable for re-entry of occupants.
7. Criteria to be used for determining completion of the work. This should include both visual inspection and air clearance according to AHERA Rule guidelines by Transmission Electron Microscopy (T.E.M.) for any response action greater than 160 square feet or 260 linear feet. Phase Contrast Microscopy (PCM) may be used for response actions less than 160 square feet or 260 linear feet.

III. SURVEILLANCE

A. PERIODIC

A periodic surveillance of all ACM must be conducted at least every six months after the management plan is in effect as part of the O & M Program. The Designated Person or someone who is appropriately trained on asbestos, i.e. two-hour awareness should conduct either the periodic surveillance.

The person conducting the periodic surveillance shall visually inspect all areas that are identified in the management plan as ACBM and record date of the surveillance, his or her name and any changes of condition. The report shall be included in the management plan.

B. THREE YEAR RE-INSPECTION

As long as any ACBM remains in a school building, the building must be re-inspected at least one every three years by an EPA accredited and TDH Licensed Asbestos Inspector and an EPA accredited TDH Licensed Management Planner must review the results of the inspection and make appropriate recommendations and modifications to the O& M plan.

IV. WORK CONTROLS

A. WORK PERMIT PROGRAM

The O & M Program should include a system to control all work that could disturb ACM. Some building owners/managers have success using a "work permit" program, which requires the person requesting the work to submit a Job Request Form to the Designated Person before any maintenance work is begun. A form should be devised that indicates the time and location of the requested work, the type of maintenance needed and available information about any ACM in the vicinity of the requested work to be noted. The contractor or other person authorized to perform the work should be identified on the work request. Upon receiving a pre-work Job Request Form, the Designated Person should take the following steps:

1. Refer to written records, building plans and any ACM inspection reports to determine whether ACM is present. Even if it is not anticipated that the material will be disturbed, the Designated Person should note the presence of the ACM on the permit form and provide additional instruction on the importance of not disturbing the ACM.

2. If ACM is both present and likely to be disturbed, the asbestos must either be removed or the work performed by an asbestos contractor licensed by the Texas Department of Health.

B CONTRACTOR NOTIFICATION

Prior to performing maintenance/repair activities, outside contractors should be required to submit the above work permit form for approval. Additionally, these outside contractors should be asked to sign a notification form that they were informed there is ACM present. A copy of this type of form can be found in the Appendix as Attachment "C". These signed forms should become part of the permanent records.

V. ASBESTOS DISTURBANCE/REMOVAL

A. SMALL SCALE/SHORT TERM

Any disturbance of asbestos in a public building must be done by a contractor licensed by the Texas Department of Health. In all cases, a notification must be filed with the Texas Department of Health ten (10) working days before the work is to start. A copy of the notification form is found in the Appendix as Attachment "B". In the case of small operations (each less than 160 s.f. or 260 l.f. or 35 c.f. in size) one consolidated notification can be made for all the operations on a single annual notification. The total amount of asbestos expected to be stripped or removed during the period January 1 to December 31 should be predicted on this form. The Texas Department of Health must be notified at least ten (10) working days before the end of the calendar year preceding the year for which the notice is being given. The building owner must keep track of the amount of asbestos removed under this notification and keep it with the O & M Program manual. An amendment must be filed if the amount of asbestos removed surpassed the amount in the original notification.

B. LARGE SCALE DISTURBANCE

Any asbestos disturbance or removal greater than 160 s.f., 260 l.f., or 35 c.f. requires a separate ten (10) day notification and the project must be designed by an Asbestos Consultant licensed by the Texas Department of Health.

VI. RECORD KEEPING

Permanent records will be kept regarding Operations and Maintenance activities in facilities under the control of the Designated Person and in a central place within the facility. These include:

A. CLEANING ACTIVITY

Whenever any cleaning activity is undertaken, records will contain the name of the individuals performing the cleaning, the dates of the cleaning, the locations cleaned, the methods utilized, and any other information pertinent to that particular cleaning episode. A copy of this O&M Report Form is included in the Appendix as Attachment "D".

B. SMALL SCALE OPERATIONS AND MAINTENANCE ACTIVITY

Whenever any Operations and Maintenance activity is undertaken, records will contain the name and duties of each person involved; the start and completion date and time of the activity; the locations where the activity occurred; a description of the activity; preventive measures used; amount (if any) of ACM removed; and the name and location of the storage or disposal site for ACM. A copy of the Small-Scale O&M Activity Report Form is included in the Appendix as Attachment "E".

C. MAJOR ACTIVITY

Whenever a major activity is undertaken, other than abatement, such as encapsulation, repair or enclosure, records will indicate the name, signature, state of accreditation, and accreditation number of each person involved; the start and completion date and time; the locations where the activity occurred; a description of the activity; preventive measures used; whether ACBM was removed. A copy of the Major O&M Activity Report Form is included in the Appendix as Attachment "F".

D. FIBER RELEASE EPISODE

For every fiber release episode, whether minor or major, the records will detail the date, time, and location of the episode; the method of repair; preventive measures or response action taken; the names of those persons doing the work; whether ACBM was removed; and the name and location of the storage disposal site for the removed material. A copy of the Fiber Release Episode Report Form is included in the Appendix as Attachment "G".

Minor Fiber Release Episode

A minor fiber release episode consists of the falling or dislodging of three square or linear feet or less of friable ACBM. Section 763.9(f)(1) of the AHERA Rule requires in combination with the Texas Asbestos Health Protection Rules that:

- The debris is thoroughly saturated using wet methods
- The area is cleaned
- The asbestos debris is placed in a sealed, leak tight container
- The area of damaged ACBM is repaired with such materials as asbestos free spackling, plaster, cement, or insulation; sealed with latex paint or an encapsulant or an appropriate response action is implemented as required by Part 763.90 of the AHERA Rule.

The clean up of a minor fiber release must be done by an abatement contractor licensed by the Texas Department of Health.

Major Fiber Release Episode

A major fiber release episode consists of the falling or dislodging of more than three square or linear feet of friable ACBM. Section 763.9(f)(2) of the AHERA Rule in combination with the Texas Asbestos Health Protection Rules requires that:

- Entry into the area is restricted and signs posted to prevent entry into the area by person other than those necessary to perform the response action.
- The air handling system is shut off or temporarily modified to prevent distribution of the fibers to other areas of the building.
- The response action for any major fiber release episode is designed by an Asbestos Consultant and conducted by a contractor licensed by the Texas Department of Health.

After a response action is implemented to manage a major fiber release episode, the final air clearance requirements of the AHERA rule must be met in order for the response action is considered complete.

E. INSPECTION REPORTS

Copies of all inspection reports, results and amendments will be kept in the file with the Operations and Maintenance Program and activity reports. This also includes results of any professional re-inspections or periodic surveillance.

F. MAINTENANCE PERSONNEL

Current list of all maintenance personnel, including name, address, date of hire, asbestos training course and dates, as well as, copies of certificates from any special related courses taken by the employees. A copy of a Maintenance Staff Training Report Form is included in the Appendix as Attachment "H".

G. ASBESTOS ABATEMENT ACTIVITY

The Designated Person should maintain a current list of all areas where asbestos removal, enclosures, or encapsulation has taken place. A copy of the Asbestos Abatement Activity Report Form is included in the Appendix as Attachment "I".

H. ACM DISPOSAL RECORDS

Copies of ACM disposal records and/or chain of custody/waste disposal manifest documentation should maintained as part of the O & M Program for a minimum of thirty years.

I. EQUIPMENT LIST

Licensed abatement contractors will perform all work; no special equipment will be required.

J. WARNING LABELS

Warning labels are required to be attached immediately adjacent to any friable and non-friable ACM and assumed ACM located in routine maintenance areas by 29 CFR 1926.1101. The labels will be of a size, print, and color which is readily visible to persons entering an area containing ACM. A copy of an acceptable label is included in the Appendix as Attachment "J".

VII. APPENDIX

**Fort Bend Independent School District
AHERA DESIGNATED PERSON**

**Mr. Jimmy Bell
Fort Bend ISD
13600 Murphy Road
Stafford, Texas 77477**

**Phone: 281-634-5588
Cell Phone: 281-682-8481**

Training Received:

Course Name: Inspector and Management Planner

Date of Training: Annual Refreshers 10/031/01

Course Hours: Inspector 24 hours Management Planner Additional 16 hours

ATTACHMENT "A", PART I

NOTICE TO STUDENTS AND GUARDIANS AND FACULTY

Fort Bend ISD, in compliance with the Asbestos Containing Materials in Schools Rule (referred to as the AHERA Rule), 40CFR, Part 763, Subpart E has arranged the inspection for asbestos of the facilities used by Hodges Bend Middle School

As a result of this inspection it was found that the following materials contain asbestos:

Floor Tile

These materials have been assessed as being in good condition. In their present condition and left undisturbed, they present no health problem to anyone. As required by the AHERA Rule we have adopted a comprehensive Operations and Maintenance Program for the management of these asbestos-containing materials. A copy of the Operations and Maintenance program is available for review at the school office.

ATTACHMENT "A", PART II

EMPLOYEE ACKNOWLEDGEMENT OF ACM

The below employees acknowledge that they have been informed of the presence of asbestos-containing materials in the Hodges Bend Middle School.

Floor Tile

_____ Employee/Date	_____ Employee/Date
_____ Employee/Date	_____ Employee/Date
_____ Employee/Date	_____ Employee/Date
_____ Employee/Date	_____ Employee/Date
_____ Employee/Date	_____ Employee/Date

ATTACHMENT "B"
(follows on next page)

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TEXAS DEPARTMENT OF HEALTH



DEMOLITION / RENOVATION
NOTIFICATION FORM

NOTE: CIRCLE ITEMS THAT ARE AMENDED

NOTIFICATION# _____

1) Abatement Contractor: _____ TDH License Number: _____
 Address: _____ City: _____ State: _____ Zip: _____
 Office Phone Number: () _____ Job Site Phone Number: _____
 Site Supervisor: _____ TDH License Number: _____
 Site Supervisor: _____ TDH License Number: _____
 Trained On-Site NESHAP Individual: _____ Certification Date: _____

Demolition Contractor: _____ Office Phone Number () _____
 Address: _____ City: _____ State: _____ Zip: _____

2) Project Consultant or Operator: _____ TDH License Number: _____
 Mailing Address: _____
 City: _____ State: _____ Zip: _____ Office Phone Number: () _____

3) Facility Owner: _____
 Attention: _____
 Mailing Address: _____
 City: _____ State: _____ Zip: _____ Owner Phone Number () _____

4) Description or Facility Name: _____
 Physical Address: _____ County: _____ City: _____ Zip: _____
 Facility Phone Number () _____ Facility Contact Person: _____
 Description of Area/Room Number: _____
 Prior Use: _____ Future Use: _____
 Age of Building/Facility: _____ Size: _____ Number of Floors: _____ School (K - 12): ☐ YES ☐ NO

5) Type of Work: ☐ Demolition ☐ Renovation (Abatement) ☐ Annual Consolidated
 Work will be during: ☐ Day ☐ Evening ☐ Night ☐ Phased Project
 Description of work schedule: _____

6) Is this a Public Building? ☐ YES ☐ NO Federal Facility? ☐ YES ☐ NO Industrial Site? ☐ YES ☐ NO
 NESHAP-Only Facility? ☐ YES ☐ NO Is Building/Facility Occupied? ☐ YES ☐ NO

7) Notification Type CHECK ONLY ONE
☐ Original (10 Working Days) ☐ Cancellation ☐ Amendment ☐ Emergency/Ordered

If this is an amendment, which amendment number is this? ____ (Enclose copy of original and/or last amendment)
 If an emergency, who did you talk with at TDH? _____ Emergency#: _____
 Date and Hour of Emergency (HH/MM/DD/YY): _____
 Description of the sudden, unexpected event and explanation of how the event caused unsafe conditions or Would cause equipment damage (computers, machinery, etc) _____

8) Description of procedures to be followed in the event that unexpected asbestos is found or previously non-friable asbestos material becomes crumbled, pulverized, or reduced to powder: _____

9) Was an Asbestos survey performed? ☐ YES ☐ NO Date: ____ / ____ / ____ TDH Inspector License No: _____
 Analytical Method: ☐ PLM ☐ TEM ☐ Assumed TDH Laboratory License No: _____
 (For TAPHA (public building) projects: an assumption must be made by a TDH Licensed Inspector)

10) Description of planned demolition or renovation work, type of material, and method(s) to be used: _____

11) Description of work practices and engineering controls to be used to prevent emissions of asbestos at the demolition/renovation: _____

12) ALL applicable items in the following table must be completed: IF NO ASBESTOS PRESENT CHECK HERE ☐

Asbestos-Containing Building Material Type	Approximate amount of Asbestos		Check unit of measurement					
	Pipes	Surface Area	Ln Ft	Ln M	SQ Ft	SQ M	Cu Ft	Cu M
RACM to be removed								
RACM NOT removed								
Interior Category I non-friable removed								
Exterior Category I non-friable removed								
Category I non-friable NOT removed								
Interior Category II non-friable removed								
Exterior Category II non-friable removed								
Category II non-friable NOT removed								
RACM Off-Facility Component								

13) Waste Transporter Name: _____ TDH License Number: _____
 Address: _____ City: _____ State: _____ Zip: _____
 Contact Person: _____ Phone Number: () _____

14) Waste Disposal Site Name: _____
 Address: _____ City: _____ State: _____ Zip: _____
 Telephone: () _____ TNRCC Permit Number: _____

15) For structurally unsound facilities, attach a copy of demolition order and identify Governmental Official below:
 Name: _____ Registration No: _____
 Title: _____
 Date of order (MM/DD/YY) ____ / ____ / ____ Date order to begin (MM/DD/YY) ____ / ____ / ____

16) Scheduled Dates of Asbestos Abatement (MM/DD/YY) Start: ____ / ____ / ____ Complete: ____ / ____ / ____

17) Scheduled Dates Demolition/Renovation (MM/DD/YY) Start: ____ / ____ / ____ Complete: ____ / ____ / ____

**** Note: If the start date on this notification can not be met, the TDH Regional or Local Program office *Must* be contacted by phone prior to the start date. Failure to do so is a violation in accordance to TACPA, Section 295.61.**

I hereby certify that all information I have provided is correct, complete, and true to the best of my knowledge. I acknowledge that I am responsible for all aspects of the notification form, including, but not limiting; content and submission dates. The maximum penalty is \$10,000 per day per violation.

 (Signature of Building Owner/ Operator
 or Delegated Consultant/Contractor) (Printed Name) (Date) ()
 (Telephone)
 ()
 (Fax Number)

MAIL TO:

ASBESTOS NOTIFICATION SECTION
 TOXIC SUBSTANCES CONTROL DIVISION
 TEXAS DEPARTMENT OF HEALTH
 PO BOX 143538
 AUSTIN, TX 78714-3538
 PH: 512-834-6600, 1-800-572-5548

Faxes are not accepted

Faxes are not accepted

ATTACHMENT "C"

CONTRACTOR NOTIFICATION

PROJECT NAME: _____

DATE: _____

The following materials in this school have been determined to contain asbestos:

Floor Tile

Therefore, in order to permit you to perform your work on the property, we ask that you acknowledge the following:

1. You understand that by performing such work at this school you may encounter asbestos-containing materials (ACM).
2. You will take all precautions necessary to prevent the release of asbestos fibers to protect the health and safety of you and your employees.
3. You will assume all liabilities arising from asbestos contamination caused by the work performed.
4. You have in your possession all necessary permits, certificates, notices, licenses or other approvals, in order to perform the necessary work.
5. You agree that under no circumstances will you cut, sand, drill, grind, scrape or otherwise disturb these asbestos-containing materials. If you do disturb any of these materials inadvertently, you agree to stop all work and notify the management at once.

ACKNOWLEDGED this date _____, 200____.

By: _____ Vendor: _____
Signature Print

Print Name

ATTACHMENT "D"

[illegible]

ATTACHMENT "E"

[illegible]

MAJOR OPERATIONS AND MAINTENANCE ACTIVITY

**DISPOSAL
SITE**

ATTACHMENT "G"

[illegible]

MAINTENANCE PERSONNEL

ATTACHMENT "H"

NAME	ADDRESS	DATE		TRAINING	TRAINING PROVIDED	ACCREDITATION (YES / NO)
		OF EMPLOYMENT	OF TRAINING			

ATTACHMENT "I"

[illegible]

ATTACHMENT "J"



**CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
AVOID BREATHING AIRBORNE ASBESTOS FIBERS**



VIII. Asbestos Inspection Report

ASBESTOS SURVEY REPORT

Hodges Bend Middle School (ID: MB)

HODGES BEND MIDDLE SCHOOL

16510 Bissonnet

Sugarland, Texas 77083

Prepared for:
FORT BEND INDEPENDENT SCHOOL DISTRICT
13600 Murphy Road
Stafford, TX 77477

Prepared by:
Dolphin Environmental Consultants
May 6, 2002
Project Number: 2193

Prepared By:



Jeff Hilburn
a TDH Licensed Asbestos Inspector
60-0578

Reviewed By:



Joe Bury
a TDH Licensed Asbestos Consultant
10-5005

Table of Contents

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	Executive Summary
1	Introduction
2	Description of Building Construction and Systems
3	Summary of Findings for Suspect Materials
4	Material Information Tables

Appendices:

A	Definitions of Terms and Assessment Criteria
B	Bulk Sampling Protocol and Analytical Methods
C	Laboratory Bulk Sampling Reports
D	Summary of Regulatory Requirements
E	Drawings Indicating Asbestos Locations
F	Drawings Indicating Material Locations

Executive Summary

Dolphin Environmental Consultants (DEC) was retained by Fort Bend Independent School District to perform an Asbestos Hazard Emergency Response Act (AHERA) style asbestos survey of the Hodges Bend Middle School (Building ID: MB), to determine the locations of accessible and to the extent feasible, inaccessible friable and non-friable asbestos containing building materials (ACBM).

Friable materials are materials that can be reduced to powder with hand pressure such as fireproofing, sprayed-on acoustic ceilings, pipe insulation, and other thermal systems insulation. All other materials such as floor tile, adhesives, plaster, stucco, and sheet rock mudding compounds are considered non-friable materials. Because friable materials are more likely to release asbestos fibers into the air when disturbed than non-friable materials, friable materials are considered a greater health concern.

No friable asbestos-containing materials were observed in the building.

Asbestos was detected or assumed in the following non-friable materials:

Floor Tile

Section 1 Introduction

Dolphin Environmental Consultants (DEC) performed an Asbestos Hazard Emergency Response Act (AHERA) style asbestos survey of the Hodges Bend Middle School located at 16510 Bissonnet, Sugarland, Texas, to identify ACBM. This report identifies the locations and asbestos content of friable and non-friable ACBM, provides assessment of the friable ACBM in relation to the material's hazard potential to building occupants and provides removal cost estimates.

Friable materials are materials that can be reduced to powder with hand pressure such as fireproofing, sprayed-on acoustic ceilings, pipe insulation, and other thermal systems insulation. All other materials such as floor tile, adhesives, plaster, stucco, and sheet rock mudding compounds are considered non-friable materials. Because friable materials are more likely to release asbestos fibers into the air when disturbed than non-friable materials, friable materials are considered a greater health concern.

All identified suspect asbestos-containing materials are summarized in Section 3. Materials testing positive for asbestos including material assessments, recommended response actions, and quantities are described in Section 4.

On Tuesday, January 9, 2001 Jeff Hilburn (60-0578), a TDH Licensed Asbestos Inspector from DEC, performed an asbestos survey of the building(s) in accordance with the Asbestos Hazard and Emergency Response Act of 1987 (AHERA).

DISCLAIMER

This report is prepared for the express use and benefit of Fort Bend Independent School District, its agents and employees. The information in this report or portions thereof may be required to be included in notifications to employees, contractors or other visitors to the building(s). This report is not intended to be used as a specification or work plan for any of the work suggested or recommended in this report.

This report is based upon conditions and practices observed at the property and information made available to the surveyor. This report does not intend to identify all hazards or unsafe practices, nor to indicate that other hazards or unsafe practices do not exist at the premises.

Section 2 Description of Building Construction and Systems

Number of Floors: 2

Year Built: 1987

Total Square Footage: 177,913

Structural components consist of:

Concrete Foundation
Steel Beams
Steel Columns

Exterior Wall construction components consist of: Other:

Interior Wall construction components consist of: Drywall
Plaster
Other:

Interior ceiling components consist of: Ceiling Tile
Drywall

Roofing construction components consist of: Tar&Felt

Heating and mechanical systems include: Boilers
Flues
Chillers
Cooling Tower
Air Handling Units
Plenum Return
Ducted Supply
Domestic Hot Water Heater
Recirculating. Domestic Hot Water
Loop

Building Description/Comments:

Two story building with brick veneer on a concrete foundation.

Section 3 Summary of Findings for Suspect Materials

The following table is a list of all materials at this building which were tested for the presence of asbestos or were assumed to contain asbestos along with overall sample results. Complete information on asbestos containing materials is included in Section 4 of this report.

Each unique material within the building is assigned a unique HM number by the surveyor at the time the survey is performed.

Section 3 and Section 4 are organized by building, surfacing, thermal systems insulation, flooring, walls, ceilings, roofing and miscellaneous materials.

Site Information

Hodges Bend Middle School (Site ID: 047)
16510 Bissonnet
Sugarland, Texas 77083

Client Information

Fort Bend Independent School District
13600 Murphy Road
Stafford, TX 77477

Survey Performed By

Dolphin Environmental Consultants

Inspector

Jeff Hilburn

Inspection Date

January 9, 2001

Job Number

2193

<i>Suspect Material</i>	<i>Category</i>	<i>HM Number</i>	<i>Material Location(s)</i>	<i>Asbestos Present?</i>
2' x 2' Directional Ceiling Tile	Miscellaneous	CT-1	FLOOR(S): 1	No
12" x 12" White w / Blue Floor Tile And Adhesive	Miscellaneous	FA-2	FLOOR(S): 1	No
12" x 12" Blue Floor Tile	Miscellaneous	FT-3	ACCENT TILE - COULD NOT SAMPLE. FLOOR(S): 1	Yes (assumed)
12" x 12" Light Blue Floor Tile	Miscellaneous	FT-4	ACCENT TILE - COULD NOT SAMPLE. FLOOR(S): 1	Yes (assumed)
12" x 12" Blue/Grey Floor Tile And Adhesive	Miscellaneous	FA-5	FLOOR(S): 1	No
Baseboard Adhesive	Miscellaneous	BA-6	FLOOR(S): 1	No
2' x 2' Drywall Ceiling Tile	Miscellaneous	CT-7	FLOOR(S): 1	No
12" x 12" Grey Floor Tile And Adhesive	Miscellaneous	FA-8	FLOOR(S): 1	No
White Duct System Joint Mastic HVAC Duct	Miscellaneous	HMAS-9	FLOOR(S): 1	No
White Mastic on HVAC Chill Water Pipe Insulation	Miscellaneous	WMCW-10	FLOOR(S): 1	No
White Mastic on HVAC Hot Water Pipe Insulation	Miscellaneous	WMHW-11	FLOOR(S): 1	No

Site Information

Hodges Bend Middle School (Site ID: 047)

Survey Performed By

Dolphin Environmental Consultants

Inspection Date

January 9, 2001

Suspect Material	Category	HM Number	Material Location(s)	Asbestos Present
White Mastic on Domestic Cold Water Pipe Insulation	Miscellaneous	WMDCW-12	FLOOR(S): 1	No
White Mastic on Domestic Hot Water Pipe Insulation	Miscellaneous	WMDHW-13	FLOOR(S): 1	No
Plaster	Surfacing	PL-14	FLOOR(S): 1	No
Drywall And Joint Compound	Miscellaneous	JC-15	FLOOR(S): 1	No
Boiler Flue	TSI	HFLUE-16	FLOOR(S): 1	No
Sprayed-on Fireproofing	Surfacing	SF-17	FLOOR(S): 1	No

Section 4 Material Information Tables

Site Information

Fort Bend Middle School (Site ID: 047)
 5510 Bissonnet
 Sugarland, Texas 77083

Client Information

Fort Bend Independent School District
 13600 Murphy Road
 Stafford, TX 77477

Survey Performed By
 Dolphin Environmental Consultants

Inspector
 Jeff Hilburn

Inspection Date
 January 9, 2001

Job Number
 2193

Material Description 2' x 2' Directional Ceiling Tile				Material Number CT-1	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Friable	EPA Category Friable	Total Quantity	Unit of Measure Square Feet	
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response		

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
CT-1-1	Main Hallway	1	Yes	0%	1) Ceiling Tile 2) 3)	0
CT-1-2	Main Hallway	1	Yes	0%	1) Ceiling Tile 2) 3)	0
CT-1-3	Main Hallway	1	Yes	0%	1) Ceiling Tile 2) 3)	0

Material Description 12" x 12" White w / Blue Floor Tile And Adhesive				Material Number FA-2	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Square Feet	
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response		

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
FT-2-4	Cafeteria	1	Yes	0%	1) Tile 2) 3)	0
FT-2-5	Main Hallway	1	Yes	0%	1) Tile 2) 3)	0
FT-2-6	Main Hallway	1	Yes	0%	1) Tile 2) 3)	0

Section 4 Material Information Tables

Site Information
Jodges Bend Middle School (Site ID: 047)

Survey Performed By
Dolphin Environmental Consultants

Inspection Date
January 9, 2001

Material Description 12" x 12" Blue Floor Tile			Material Number FT-3	Asbestos Present? Yes (assumed)
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)
 ACCENT TILE - COULD NOT SAMPLE.
 FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer

Material Description 12" x 12" Light Blue Floor Tile			Material Number FT-4	Asbestos Present? Yes (assumed)
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)
 ACCENT TILE - COULD NOT SAMPLE.
 FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer

Section 4 Material Information Tables

Information
Jodges Bend Middle School (Site ID: 047)

Survey Performed By
Dolphin Environmental Consultants

Inspection Date
January 9, 2001

Material Description 12" x 12" Blue/Grey Floor Tile And Adhesive			Material Number FA-5	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
FT-5-7	Stage	1	Yes	0%	1) Tile 2) Yellow Mastic 3)	0 0
FT-5-8	Stage	1	Yes	0%	1) Tile 2) Yellow Mastic 3)	0 0
FT-5-9	Stage	1	Yes	0%	1) Tile 2) Yellow Mastic 3)	0 0

Material Description Baseboard Adhesive			Material Number BA-6	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Linear Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
MASTIC-6-10	Room 1907	1	Yes	0%	1) Mastic 2) 3)	0
MASTIC-6-11	Room 1403	1	Yes	0%	1) Mastic 2) 3)	0
MASTIC-6-12	Room 2406	1	Yes	0%	1) Mastic 2) 3)	0

Section 4 Material Information Tables

Information
Jodges Bend Middle School (Site ID: 047)

Survey Performed By
Dolphin Environmental Consultants

Inspection Date
January 9, 2001

Material Description 2' x 2' Drywall Ceiling Tile			Material Number CT-7	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Friable	EPA Category Friable	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
CT-7-13	Kitchen	1	Yes	0%	1) Ceiling Tile 2) 3)	0
CT-7-14	Kitchen	1	Yes	0%	1) Ceiling Tile 2) 3)	0
CT-7-15	Restroom	1	Yes	0%	1) Ceiling Tile 2) 3)	0

Material Description 12" x 12" Grey Floor Tile And Adhesive			Material Number FA-8	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
FT-8-16	Room 1013	1	Yes	0%	1) Tile 2) Yellow Mastic 3)	0 0
FT-8-17	Room 1013	1	Yes	0%	1) Tile 2) Yellow Mastic 3)	0 0
FT-8-18	Room 1013	1	Yes	0%	1) Tile 2) Yellow Mastic 3)	0 0

Section 4 Material Information Tables

Site Information

Fort Bend Middle School (Site ID: 047)

Survey Performed By

Dolphin Environmental Consultants

Inspection Date

January 9, 2001

Material Description White Duct System Joint Mastic HVAC Duct			Material Number HMAS-9	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Friable	EPA Category Category I	Total Quantity	Unit of Measure Linear Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
MASTIC-9-19	Mechanical Room Above Gym	1	Yes	0%	1) Wrapping 2) Pink Insulation 3)	0 0 0
MASTIC-9-20	Mechanical Room 1305	1	Yes	0%	1) Wrapping 2) Pink Insulation 3)	0 0 0
MASTIC-9-21	Mechanical Room 1520	1	Yes	0%	1) Wrapping 2) Pink Insulation 3)	0 0 0

Material Description White Mastic on HVAC Chill Water Pipe Insulation			Material Number WMCW-10	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Linear Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
MASTIC-10-22	Mechanical Room Above Gym	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0 0
MASTIC-10-23	Mechanical Room 1305	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0 0
MASTIC-10-24	Mechanical Room 1520	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0 0

Section 4 Material Information Tables

Information
Jodges Bend Middle School (Site ID: 047)

Survey Performed By
Dolphin Environmental Consultants

Inspection Date
January 9, 2001

Material Description White Mastic on HVAC Hot Water Pipe Insulation			Material Number WMHW-11	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
MASTIC-11-25	Mechanical Room Above Gym	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0
MASTIC-11-26	Mechanical Room 1305	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0
MASTIC-11-27	Mechanical Room 1520	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0

Material Description White Mastic on Domestic Cold Water Pipe Insulation			Material Number WMDCW-12	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Linear Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
MASTIC-12-28	Mechanical Room 1222	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0
MASTIC-12-29	Mechanical Room 1222	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0
MASTIC-12-30	Mechanical Room 1222	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0

Section 4 Material Information Tables

Site Information
Fort Bend Middle School (Site ID: 047)

Survey Performed By
Dolphin Environmental Consultants

Inspection Date
January 9, 2001

Material Description White Mastic on Domestic Hot Water Pipe Insulation			Material Number WMDHW-13	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category I	Total Quantity	Unit of Measure Linear Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
MASTIC-13-31	Mechanical Room 1222	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0
MASTIC-13-32	Mechanical Room 1222	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0
MASTIC-13-33	Mechanical Room 1222	1	Yes	0%	1) Wrapping 2) Insulation 3)	0 0

Material Description Plaster			Material Number PL-14	Asbestos Present? No
Material Category Surfacing	Friable Classification Non-Friable	EPA Category Friable	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
PL-14-34	Boys Locker Room	1	Yes	0%	1) Wall Plaster 2) 3)	0
PL-14-35	Boys Locker Room	1	Yes	0%	1) Wall Plaster 2) 3)	0
PL-14-36	Boys Locker Room	1	Yes	0%	1) Wall Plaster 2) 3)	0

Section 4 Material Information Tables

Information
Hodges Bend Middle School (Site ID: 047)

Survey Performed By
Dolphin Environmental Consultants

Inspection Date
January 9, 2001

Material Description Drywall And Joint Compound			Material Number JC-15	Asbestos Present? No
Material Category Miscellaneous	Friable Classification Non-Friable	EPA Category Category II	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
JC-15-37	Electrical Closet - Office	1	Yes	0%	1) Sheetrock 2) 3)	0
JC-15-38	Electrical Closet - Office	1	Yes	0%	1) Sheetrock 2) 3)	0
JC-15-39	Electrical Closet - Office	1	Yes	0%	1) Sheetrock 2) 3)	0

Material Description Boiler Flue			Material Number HFLUE-16	Asbestos Present? No
Material Category TSI	Friable Classification Friable	EPA Category Friable	Total Quantity	Unit of Measure Linear Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
HFLUE-16-P001	Boiler Room	1	Yes	0%	1) Insulation 2) 3)	0
HFLUE-16-P002	Boiler Room	1	Yes	0%	1) Insulation 2) 3)	0
HFLUE-16-P003	Boiler Room	1	Yes	0%	1) Insulation 2) 3)	0

Section 4 Material Information Tables

Information
Jodges Bend Middle School (Site ID: 047)

Survey Performed By
Dolphin Environmental Consultants

Inspection Date
January 9, 2001

Material Description Sprayed-on Fireproofing			Material Number SF-17	Asbestos Present? No
Material Category Surfacing	Friable Classification Friable	EPA Category Friable	Total Quantity	Unit of Measure Square Feet
General Condition Good	Damage Category	Overall Material Assessment No Assessment, Non-asbestos	Recommended Response	

General Material Comments

Material Location(s)

FLOOR(S): 1

Sample ID(s)	Sample Location(s)	Floor	Analyzed	Overall Result	Layer(s) Reported by Lab	Results by Layer
SF-17-P007	Hallway Column	1	Yes	0%	1) Fireproofing 2) 3)	0
SF-17-P008	Hallway Column	1	Yes	0%	1) Fireproofing 2) 3)	0
SF-17-P009	Hallway Column	1	Yes	0%	1) Fireproofing 2) 3)	0
SF-17-P010	Hallway Column	1	Yes	0%	1) Fireproofing 2) 3)	0
SF-17-P011	Hallway Column	1	Yes	0%	1) Fireproofing 2) 3)	0
SF-17-P012	Hallway Column	1	Yes	0%	1) Fireproofing 2) 3)	0
SF-17-P013	Hallway Column	1	Yes	0%	1) Fireproofing 2) 3)	0

Appendix A
Definitions of Terms and Assessment Criteria

potential, with the first being the lowest hazard are as follows: 1) Potential for Damage, 2) Potential for Significant Damage, 3) Damaged, 4) Damaged with Potential for Damage, 5) Damaged with Potential for Significant Damage, and 6) Significantly Damaged. Only friable materials are assessed under AHERA regulations. Non-friable materials, unless damaged, are not assessed and can be assumed to be in good condition.

Damaged - The damage or deterioration of the material results in inadequate cohesion or adhesion with crumbling, blistering, water stains, marring or otherwise abraded over less than one-tenth (1/10) of the surface if the damage is evenly distributed or one-fourth (1/4) if the damage is localized.

Significant Damage - The damage or deterioration of the material results in inadequate adhesion or cohesion and the damage is extensive and severe with one or more of the following characteristics: 1) Crumbling or blistering over at least one-tenth (1/10) of the surface if evenly distributed, one-fourth (1/4) if the damage is localized; 2) Areas of the material hanging from the surface, delaminated, or showing adhesive failure; 3) Water stains, gouges or marred.

Recommended Response suggests the appropriate options for controlling or maintaining ACBM in a safe manner. There are four options used:

Operations & Maintenance (O&M) - A program designed to "manage" asbestos in-place. As long as asbestos containing materials remain in a building, an O&M program should be instituted to alert maintenance personnel, custodial workers and outside vendors of the existence and location of these materials and to set a policy for the maintenance of these materials. The material is usually only required to be removed if it is significantly damaged, prior to demolition of the building or if it will be disturbed by renovation activities.

Repair - The restoration of damaged or deteriorated asbestos containing building materials to an intact condition. Once the intact condition is established, the material should be included in an O&M program. The material is usually only required to be removed if it is significantly damaged, prior to demolition of the building or if it will be disturbed by renovation activities.

Abate Due to Condition - This material is significantly damaged and is unsafe in its current condition. The access to the area should be restricted to personnel equipped with appropriate personal protection. This material should be properly removed by a licensed contractor using workers trained in the safe removal of asbestos.

Abate Prior to Renovation - This material should be properly removed prior to planned renovation activities by a licensed contractor using workers trained in the safe removal of asbestos. This recommendation is usually made only on survey reports prepared prior to planned renovation activities.

Comments & Damage Description contains any additional information and or specific details of material damage are noted here.

EPA Category provides the appropriate material category as outlined in the NESHAPS regulation. The four options are friable, Category 1, Category 2, and needs determination.

Friable - Materials containing greater than 1% asbestos are always considered Regulated Asbestos Containing Materials (RACM) that require removal prior to building renovation or demolition activities that impact the material.

Category 1 - Materials that are bituminous non-friable and contain more than 1% asbestos that become RACM and require removal only when will be subject to grinding, cutting, sanding or abrading.

Category 2 - Materials that are non-friable and contain more than 1% asbestos that will have a high probability of being crumbled, pulverized or reduced to a powder by the demolition or renovation activity. These material usually become RACM and will require removal.

Bulk Sampling Protocol and Analytical Methods

Bulk samples of suspect asbestos containing building materials were obtained using standard industrial hygiene techniques including wetting the material to minimize fiber release. Our personnel wore half-face air purifying respirators equipped with high efficiency particulate (HEPA) filters while obtaining samples

Our sampling strategy for suspect friable surfacing materials was based on the guidelines outlined in the EPA publication Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials, and the procedures outlined in 40 CFR 763, Subpart E (ASHERA). For non-friable suspect materials, ASHERA requires the building inspector to determine the appropriate number of samples to obtain and analyze. Usually one to three samples of non-friable materials are collected.

For each homogeneous material identified by visual inspection as suspect material, random samples are obtained. A single bulk sample is randomly selected from each homogeneous material for first-round testing. If the sample is positive, the remaining samples are not analyzed; if the sample is negative, the other samples are submitted for study. Every sample must be reported negative if the material is to be considered non-asbestos containing.

The bulk samples were delivered to DH Analytical Services, 10707 Corporate Drive, Stafford, Texas 77477. DH Analytical Services' Texas Department of Health license number is 30-0261. DH Analytical Services participates in the bulk sample proficiency analysis program conducted by the United States Environmental Protection Agency and is accredited by the National Voluntary Laboratory Program (NVLAP), accreditation number 102086. The samples were analyzed using Polarized Light Microscopy (PLM) with dispersion staining to estimate the percent of asbestos composition by volume. Samples with no observable asbestiform minerals are designated as None-Detected. Samples in which asbestiform minerals are observed, but exist in concentrations of less than one percent (<1%), are designated as present in Trace amounts; all other samples are designated as asbestos containing with the appropriate percent of asbestos noted.

Appendix B
Bulk Sampling Protocol and Analytical Methods

Definitions of Terms and Assessment Criteria

This survey report organizes information on each suspect ACBM identified in tables located in Section 4. This section describes how to interpret the data found on materials listed in Section 4.

Material description contains the description of the suspect homogeneous asbestos containing building material.

Material Serial Number is used to reference the material for reinspections, etc..

Homogeneous Area means an area of surfacing material, thermal system insulation material, or miscellaneous material that is uniform in color and texture.

Asbestos type and content describes the type of asbestos and its percentage in the material.

Asbestos Results for positive materials are shown as a percentage. Samples having less than 1% asbestos are reported as containing "Trace" amounts of asbestos and samples with no detected asbestos are reported as "BLD" or below limit of detection.

Sample number(s) identifies a particular material sample obtained from a specific sample location. Sample numbers are used primarily for laboratory identification.

Sample Location identifies where the samples of this material were obtained.

Material Category categorizes each material as surfacing, TSI or miscellaneous.

Surfacing Materials - Asbestos containing materials that are sprayed-on, trowled-on or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

Thermal Systems Insulation (TSI) - Asbestos containing materials applied to pipes, fittings, boilers, breaching, tanks, ducts or other interior structural components to prevent heat loss or gain or water condensation.

Miscellaneous Materials - Asbestos containing materials applied to or a part of building components that are not classified as surfacing materials or thermal systems insulation.

Quantity & Units reports approximate total quantity per unit of measure for each material.

Building(s) & Floor(s) specifies where a material is located.

Material Location describes where the material is found throughout the building.

Material Condition identifies the material as Friable, Non-friable or Jacketed (for thermal systems insulation only) if asbestos is present.

Friable - An asbestos containing material that can be crumbled, pulverized or reduced to powder, when dry, by hand pressure, such as spray applied fireproofing on structural steel members, spray applied acoustical ceiling materials or damaged thermal systems insulation. Friable materials are of greatest concern due to their potential fiber release.

Non-Friable - An asbestos containing material where the asbestos is bound tightly in a matrix or sealed by a protective layer. Non-friable materials can become friable by being rendered to a crumbled, pulverized or powdered state, when dry, by crushing, sanding, sawing, shot-blasting, severe weathering or by other mechanically induced means. Common examples of non-friable materials are adhesives, floor tiles, transite and roofing materials.

Jacketed - An asbestos containing material applied to thermal systems insulation and "jacketed" with a protective outer layer such as canvas or metal to keep the material in good condition. Undamaged jacketed ACBM is considered non-friable. If the jacketing is damaged, the material is considered friable.

Damage Category describes the type of damage, if any, to the material. The following damage categories are used: None, Physical, Air, and Water.

Material Assessment identifies the condition of the material in relation to physical and water damage, delamination of the material from its substrate, the extent of the damage and the potential for damage from building conditions, such as, accessibility by building occupants, influence of vibration, etc. The six standard assessment categories ranked by hazard

Appendix C
Laboratory Bulk Sampling Reports



D H Analytical Services

Polarized Light Microscopy Report

Analysis Method: Improved Interim (40CFR Part 763 Appendix E to Subpart E) / AHERA (EPA-600 / R - 93 / 116)

Sample Prep Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion staining / becke line method.

Client Information:

Dolphin Environmental Consultants
10707 Corporate Drive, Suite 102
Stafford, Texas 77477

phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:

January 12, 2001

DHA project no.

DHA000708

Client project name
and number:

Hodges Bend Middle
School - Main Building

Samples received: 01-11-01

Turn-around time: 24 Hours

PO number:

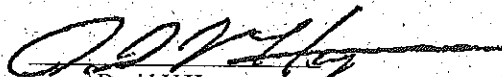
Sample #	Layer #	Analysts Physical Description of Subsample	Homo- geneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
01	1	White Ceiling Tile	Y	None Detected	40% Cellulose 40% Fiberglass	20% Other
02	1	White Ceiling Tile	Y	None Detected	40% Cellulose 40% Fiberglass	20% Other
03	1	White Ceiling Tile	Y	None Detected	40% Cellulose 40% Fiberglass	20% Other
04	1	White Floor Tile	Y	None Detected		100% Carbonate
05	1	White Floor Tile	Y	None Detected		100% Carbonate
06	1	White Floor Tile	Y	None Detected		100% Carbonate
07	1	Grey Floor Tile	Y	None Detected		100% Carbonate
	2	Yellow Mastic	Y	None Detected	2% Cellulose	98% Other

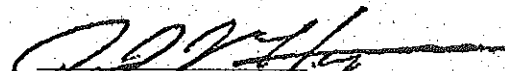
NVLAP #102086

TDH #30-0261

page 1 of 8

Approved Signatory:


David V Heyser
Analyst(s)


David V Heyser

Notes:
Some samples (floor tiles, surfacing, etc.) may contain fibers too small to be detectable by PLM. TEM Chatfield analysis of bulk material is recommended in this case.
All asbestos percentages are based on calibrated visual estimates traceable to NIST standards for regulated asbestos types. Analysts' percentages are susceptible to a coefficient of variance. All percentages fall within a range of acceptable percentages, depending on the actual concentration of asbestos. DH Analytical Services is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for selected test methods for bulk asbestos fiber analysis (PLM). This test report relates only to the items tested. Neither NVLAP nor EPA accreditation implies endorsement by any US Government agency. This report may not be reproduced except in full, without written permission by DH Analytical Services.



D H Analytical Services

Polarized Light Microscopy Report

Analysis Method: Improved Interim (40CFR Part 763 Appendix E to Subpart E) / AHERA (EPA-600 / R - 93 / 116)

Sample Prep Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion staining / becke line method.

Client Information:

Dolphin Environmental Consultants
10707 Corporate Drive, Suite 102
Stafford, Texas 77477

phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:

January 12, 2001

DHA project no.

DHA000708

Client project name
and number:

Hodges Bend Middle
School - Main Building

Samples received:

01-11-01

Turn-around time:

24 Hours

PO number:

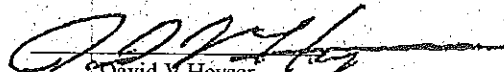
Sample #	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
08	1	Grey Floor Tile	Y	None Detected		100% Carbonate
	2	Yellow Mastic	Y	None Detected	2% Cellulose	98% Other
09	1	Grey Floor Tile	Y	None Detected		100% Carbonate
	2	Yellow Mastic	Y	None Detected	2% Cellulose	98% Other
10	1	Black Roofing Material	Y	None Detected		100% Other
11	1	Black Roofing Material	Y	None Detected		100% Other
12	1	Black Roofing Material	Y	None Detected		100% Other
13	1	Sheet Rock Ceiling Tile	Y	None Detected	10% Cellulose	90% Other

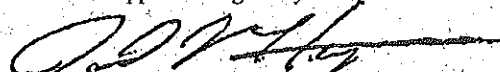
NVLAP #102086

TDH #30-0261

page 2 of 8

Approved Signatory:


David V Heyser
Analyst(s)


David V Heyser

Notes:
Some samples (floor tiles, surfacing, etc.) may contain fibers too small to be detectable by PLM. TEM Chatfield analysis of bulk material is recommended in this case.
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D H Analytical Services

Polarized Light Microscopy Report

Analysis Method: Improved Interim (40CFR Part 763 Appendix E to Subpart E) / AHERA (EPA-600 / R - 93 / 116)

Sample Prep Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion staining / becke line method.

Client Information:
Dolphin Environmental Consultants
10707 Corporate Drive, Suite 102
Stafford, Texas 77477

phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:
January 12, 2001

DHA project no.
Client project name
and number:

DHA000708
Hodges Bend Middle
School - Main Building

Samples received: 01-11-01
Turn-around time: 24 Hours
PO number:

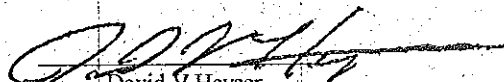
Sample #	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
14	1	Sheet Rock Ceiling Tile	Y	None Detected	10% Cellulose	90% Other
15	1	Sheet Rock Ceiling Tile	Y	None Detected	10% Cellulose	90% Other
16	1	Grey Floor Tile	Y	None Detected		100% Carbonate
	2	Yellow Mastic	Y	None Detected	2% Cellulose	98% Carbonate
17	1	Grey Floor Tile	Y	None Detected		100% Carbonate
	2	Yellow Mastic	Y	None Detected	2% Cellulose	98% Carbonate
18	1	Grey Floor Tile	Y	None Detected		100% Carbonate
	2	Yellow Mastic	Y	None Detected	2% Cellulose	98% Carbonate

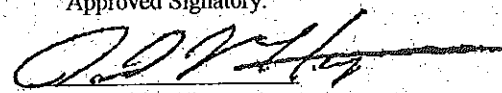
NVLAP #102086

TDH #30-0261

page 3 of 8

Approved Signatory:


David V Heyser
Analyst(s)


David V Heyser

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D H Analytical Services

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Client Information:

Dolphin Environmental Consultants
10707 Corporate Drive, Suite 102
Stafford, Texas 77477

phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:

January 12, 2001

DHA project no.

Client project name
and number:

DHA000708

Hodges Bend Middle
School - Main Building

Samples received:

01-11-01

Turn-around time:

24 Hours

PO number:

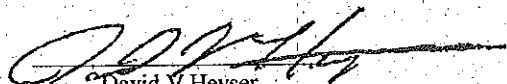
Sample #	Layer #	Analysts Physical Description of Subsample	Homo-geneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
19	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Pink Insulation	Y	None Detected	100% Fiberglass	
20	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Pink Insulation	Y	None Detected	100% Fiberglass	
21	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Pink Insulation	Y	None Detected	100% Fiberglass	
22	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	

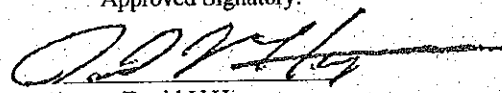
NVLAP #102086

TDH #30-0261

page 4 of 8

Approved Signatory:


David V Heyser
Analyst(s)


David V Heyser

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D H Analytical Services

Polarized Light Microscopy Report

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Sample Prep Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion staining / becke line method.

Client Information:

Dolphin Environmental Consultants
10707 Corporate Drive, Suite 102
Stafford, Texas 77477

phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:

January 12, 2001

DHA project no.

Client project name
and number:

DHA000708

Hodges Bend Middle
School - Main Building

Samples received: 01-11-01

Turn-around time: 24 Hours

PO number:

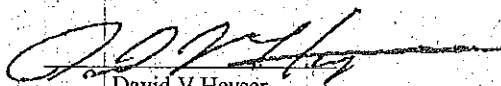
Sample #	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
23	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
24	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
25	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
26	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	

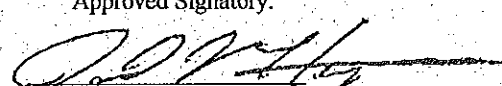
NVLAP #102086

TDH #30-0261

page 5 of 8

Approved Signatory:


David V Heyser
Analyst(s)


David V Heyser

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D H Analytical Services

Polarized Light Microscopy Report

Analysis Method: Improved Interferon (40CFR Part 763 Appendix E to Subpart E) / AHERA (EPA-600 / R - 93 / 116)

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Client Information:

Dolphin Environmental Consultants
10707 Corporate Drive, Suite 102
Stafford, Texas 77477

phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:

January 12, 2001

DHA project no.

Client project name
and number:

DHA000708

Hodges Bend Middle
School - Main Building

Samples received:

01-11-01

Turn-around time:

24 Hours

PO number:

Sample #	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
27	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
28	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
29	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
30	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	

NVLAP #102086

TDH #30-0261

page 6 of 8

Approved Signatory:

David V Heyser
Analyst(s)

David V Heyser

test:

Some samples (floor tiles, surfacing, etc.) may contain fibers too small to be detectable by PLM. TEM Chatfield analysis of bulk material is recommended in this case. All asbestos percentages are based on calibrated visual estimates traceable to NIST standards for regulated asbestos types. Analysts' percentages are susceptible to a coefficient of variance. All percentages fall within a range of acceptable percentages, depending on the actual concentration of asbestos. DH Analytical Services is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for selected test methods for bulk asbestos fiber analysis (PLM). This test report relates only to the items tested. Neither NVLAP nor EPA accreditation implies endorsement by any US Government agency. This report may not be reproduced except in full, without written permission by DH Analytical Services.



D H Analytical Services

Polarized Light Microscopy Report

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phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:

January 12, 2001

DHA project no.

Client project name
and number:

DHA000708

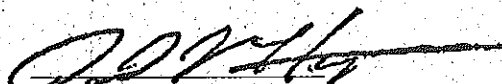
Hodges Bend Middle
School - Main Building

Samples received: 01-11-01

Turn-around time: 24 Hours

PO number:

Sample #	Layer #	Analysts Physical Description of Subsample	Homo-geneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
31	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
32	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
33	1	White Mastic Wrapping	Y	None Detected	10% Fiberglass 10% Wollastonite	80% Other
	2	Yellow Insulation	Y	None Detected	100% Fiberglass	
34	1	White Plaster	Y	None Detected	2% Cellulose	98% Other
35	1	White Plaster	Y	None Detected	2% Cellulose	98% Other

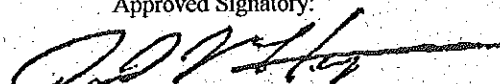

David V Heyser
Analyst(s)

NVLAP #102086

TDH #30-0261

page 7 of 8

Approved Signatory:


David V Heyser

As:

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D H Analytical Services

Polarized Light Microscopy Report

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Client Information:

Dolphin Environmental Consultants
10707 Corporate Drive, Suite 102
Stafford, Texas 77477

phone # 281-240-4646

fax # 281-240-5659

Attn: Joe Bury

Report Date:

January 12, 2001

DHA project no.

Client project name
and number:

DHA000708

Hodges Bend Middle
School - Main Building

Samples received:

01-11-01

Turn-around time:

24 Hours

PO number:

Sample #	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
36	I	White Plaster	Y	None Detected	2% Cellulose	98% Other
37	I	Sheet Rock	Y	None Detected	30% Cellulose	70% Other
38	I	Sheet Rock	Y	None Detected	30% Cellulose	70% Other
39	I	Sheet Rock	Y	None Detected	30% Cellulose	70% Other

David V Heyser
Analyst(s)

NVLAP #102086

TDH #30-0261

page 8 of 8

Approved Signatory:

David V Heyser

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Asbestos bulk Sample Chain of Custody Form v5.1

Project Number:

Site ID:

Building ID:

Building Name:

Hodges Bend Middle School

MS

Main Building

Date Collected: 1-9-01

Page: 1 of 3

Sampled By: J. Spill

HM#	Sample ID Material Code	Sample Number	Space Code	Post Sample Location	Floor	X Coord.	Y Coord.	Comments	Results
1		01		Main Hallway				2 x 2 CT	
1		02		Main Hallway					
1		03		Main Hallway					
2		04		Celebric				12' x 12 FT white	
2		05		Main Hallway					
2		06		Main Hallway					
3		07		Stacy				12' x 12 FT Blue/Grey	
3		08		Stacy					
3		09		Stacy					
6		10		Room 1907				Box Mestlin	
6		11		Room 1403					
6		12		Room 2406					
7		13		Kitchen				2 x 2 CT	
7		14		Kitchen					
7		15		Restroom					
9		16		Room 1013				12' x 12 FT - Grey	
8		17		Room 1013				0	
8		18		Room 1013					

Turn Around Time: 12 hr 12hr 24hr 48hr Ext

Method: PLM Standard PLM Point Count TEM Qual TEM Quant

Analyze to 1st Positive: Yes No

Transfer Results Electronically? Yes No

Courier Name:

Relinquished By:

Date/Time:

Received By:

Date/Time:

For Lab Use

Sealed Condition

DOLPHIN ENVIRONMENTAL
10707 CORPORATE DR. #102
STAFFORD, TX 77477-4001
Phone 281-240-4646;
Fax 281-240-5659

Attention:

Special Instructions:

000708

Asbestos Bulk Sample Chain of Custody Form v5.1

Project Number:

File ID:

Building ID:

Building Name:

Date Collected: 1-9-01

Page: 2 of 3

Sampled by: James Wilburn

000708

HM #	Sample Material Code	Sample Number	Space Code	Post Sample Location	Floor	X Coord.	Y Coord.	Comments	Results
9		19		Mech Room Above Gym				White Plastic	
9		20		Mech Room Above Gym 1305					
9		21		Mech Room Above Gym					
10		22		Mech Room 1520					
10		23		Mech Room Above Gym				White Plastic	
10		24		Mech Room 1305					
11		25		Mech Room 1520					
11		26		Mech Room above Gym				White Plastic	
11		27		Mech Room 1305					
12		28		Mech Room 1520					
12		29		Mech Room 1222				White Plastic	
12		30		Mech Room 1222					
13		31		Mech Room 1222				White Plastic	
13		32		Mech Room 1222					
13		33		Mech Room 1222					
14		34		Boys Locker Room				Plaster	
14		35		Boys Locker Room				0	
14		36		Boys Locker Room					

Relinquished By:

Date/Time:

~~For Lab Use~~

Agnes Miller

2/11/01 Jan

وہی ہے جس نے

○

Turn Around Time: ___ hr 12hr 24hr 48hr Ext

Method: PLM Standard PLM Point Count TEM Qual TEM Quant

Analyze to 1st Positive: Yes ~~No~~

[illegible]

Courier Name:

DOLPHIN ENVIRONMENTAL
10707 CORPORATE DR. #102
STAFFORD, TX 77477-4001
Phone 281-240-4646;
Fax 281-240-5659

Attention:

Special Instructions:

Asbestos -Jlk Sample Chain of Custody Form v5.1

Project Number:

Site ID:

Building ID:

Building Name:

Date Collected: 1-9-00

Page: 5 of 3

Sampled By: J. M. Wilson

[illegible]

Relinquished By:

Date/Time:

For Lab Use



Received by

Date/Time:

2010年10月1日

[illegible]

05, No

Turn Around Time: _____ hr 12hr 24hr 48hr Ext

Method: ~~PLM Standard~~ PLM Point Count TEM Qual TEM Quant

Analyze to 1st Positive: Yes No

Transfer Results Electronically? Yes No

Courier Name:

DOLPHIN ENVIRONMENTAL
10707 CORPORATE DR. #102
STAFFORD, TX 77477-4001
Phone 281-240-4646;
Fax 281-240-5659

Attention:

Special Instructions:

Appendix D
Summary of Regulatory Requirements

Appendix D Summary of Regulatory Requirements

This appendix provides a summary of building owner and manager requirements under various asbestos regulations promulgated by the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) to protect building occupants and employees from exposure to asbestos.

Survey Requirements

Prior to any renovation activity, OSHA and EPA regulations require that a complete asbestos survey be performed to determine if asbestos is present in any suspect asbestos containing material that will be present in the construction or work area. This survey report addresses accessible materials. It is recommended that prior to renovation activities, inaccessible areas that could contain asbestos materials be inspected.

Notification and Posting Requirements

Regulatory agencies feel that the building owner or manager should be responsible for knowing and communicating the locations of asbestos in their buildings to building employees, outside contractors and tenants to prevent exposure to asbestos.

Under the California Health and Safety Code, building owners and managers are required to provide annual notifications regarding known asbestos containing materials in their buildings to building employees, tenants, vendors and outside contractors. Therefore, specific information contained in this survey report is required to be included in the notification.

OSHA requires building employees, outside contractors, vendors and construction contractors bidding on or performing work in buildings be provided with notification regarding asbestos containing materials in their work areas. OSHA also requires that asbestos warning signs be posted in mechanical rooms.

Removal Requirements

Under EPA regulations, asbestos containing materials must be properly removed by licensed asbestos abatement contractors prior to renovation or demolition activities that would disturb friable materials or cause non-friable materials to become friable and a regulated material.

Repair of Damaged Materials and Cleanup of Debris

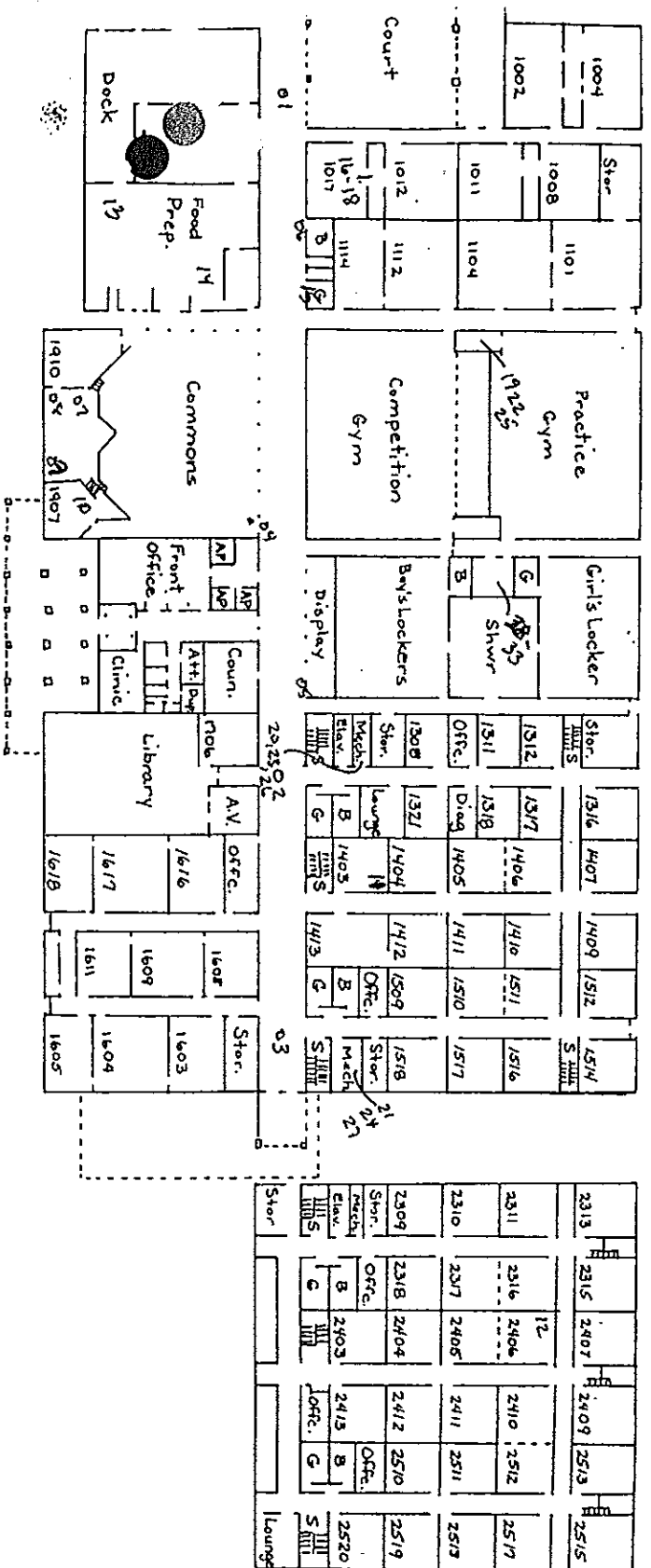
OSHA requires that asbestos containing debris be immediately cleaned up. It is recommended that damaged materials that may release fibers be repaired as soon as possible to prevent fiber release and potential exposures.

Training Requirements

OSHA requires employers whose employees are likely to or required to disturb asbestos to receive an asbestos training course. Refresher training is required to be provided annually.

Appendix E
Drawings Indicating Asbestos Locations

Appendix F
Drawings Indicating Sampling Locations



Dodge Bond Middle School

ELECTRICAL

GAS

WATER

Main Turn off

IX. Credentials

TEXAS

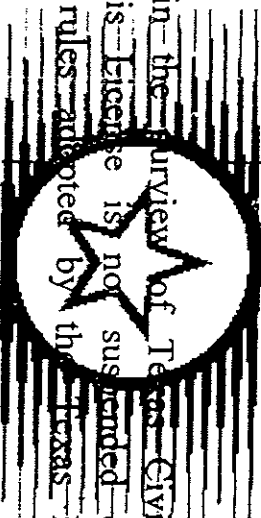
DEPARTMENT OF HEALTH

BE IT KNOWN THAT

HANSBURY ENTERPRISES IN/DBA
DOLPHIN ENVIRONMENTAL CONSULTANTS

is Licensed and authorized to perform as an
Asbestos Consultant Agency

in the State of Texas within the purview of the Texas Civil Statutes, Article 4477-3a,
as amended, so long as this license is not suspended or revoked and is renewed
according to the rules adopted by the Texas Board of Health.



10-0001
License Number

12/03/2001
Issue Date

12/02/2002
Expiration Date

This certificate is void
after expiration date.

Todd F. Wingle

Todd F. Wingle, P.E.
Chief, Asbestos Programs Branch
Occupational Safety and Health Division

C. E. Bell, M.D.

Charles E. Bell, M.D.
Executive Deputy Commissioner

VOID IF ALTERED NON-TRANSFERABLE
61871

TEXAS

DEPARTMENT OF HEALTH

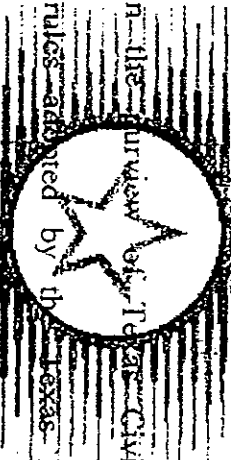
BE IT KNOWN THAT

HANSBURY ENTERPRISES INC/DBA
DH ANALYTICAL SERVICES

is Licensed and authorized to perform as an

Asbestos Laboratory

PCM, PL, M



in the State of Texas within the purview of the Texas Civil Statutes, Article 4477-3a,
according to the rules adopted by the Texas Board of Health.

30-0261
License Number

10/17/2001
Issue Date

10/16/2002
Expiration Date

This certificate is void
after expiration date.

Todd F. Winger

Todd F. Winger, P.E.
Chief, Asbestos Programs Branch
Occupational Safety and Health Division

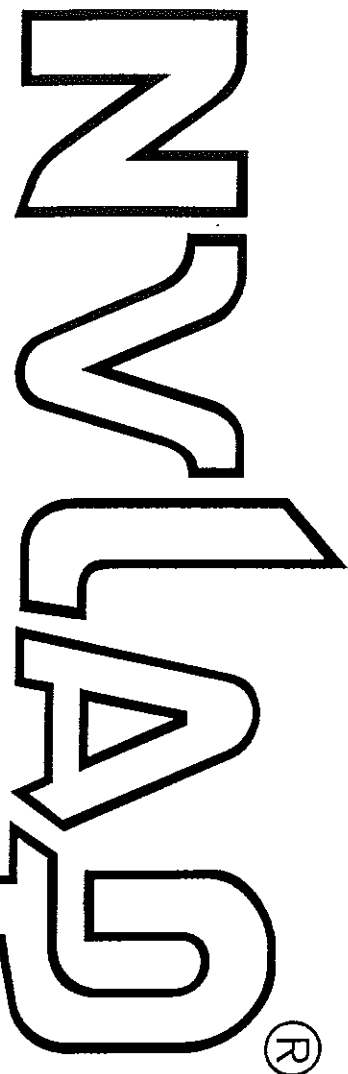
C. E. Reed, M.D.

Charles E. Reed, M.D.
Executive Deputy Commissioner

VOID IF ALTERED NON-TRANSFERABLE

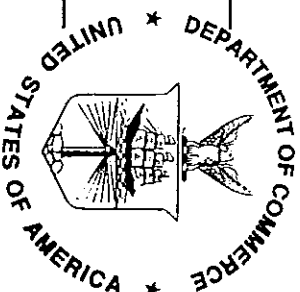
61327

United States Department of Commerce
National Institute of Standards and Technology



ISO/IEC GUIDE 25:1990
ISO 9002:1987

Certificate of Accreditation



DH ANALYTICAL SERVICES
STAFFORD, TX

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

BULK ASBESTOS FIBER ANALYSIS

June 30, 2002

Effective through

David T. Alderman

For the National Institute of Standards and Technology

NVLAP Lab Code: 102086-0

National Institute
of Standards and Technology



National Voluntary
Laboratory Accreditation Program

ISO/IEC GUIDE 25:1990
ISO 9002:1987

Scope of Accreditation



Page: 1 of 1

BULK ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 102086-0

DH ANALYTICAL SERVICES

4111 Greenbriar, Suite D

Stafford, TX 77477

Mr. Joseph Bury

Phone: 281-240-8111 Fax: 281-240-8115

E-Mail: dhanalytical@aol.com

NVLAP Code

Designation

18/A01

EPA-600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk
Insulation Samples

June 30, 2002

Effective through

A handwritten signature in dark ink, reading "David F. Alderman".

For the National Institute of Standards and Technology

Texas Department of Health certifies that:

JOSEPH BURY

License Number 105005

is Licensed as an

Individual Asbestos Consultant

From 12/03/2001 To 12/02/2002

Eduardo J. Sanchez, M.D., M.P.H.

Eduardo J. Sanchez, M.D., M.P.H.
Commissioner of Health

Control No. 61865



Texas Department of Health certifies that:

JEFFREY L. HILBURN

License Number 600578

is Licensed as an

Asbestos Inspector

From 03/27/2002 To 03/26/2003

Eduardo J. Sanchez, M.D., M.P.H.

Eduardo J. Sanchez, M.D., M.P.H.
Commissioner of Health

Control No. 63880



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CERTIFICATE OF ASBESTOS FREE CONSTRUCTION

Fort Bend Independent School District
Stephen F. Austin HS #6
3434 Pheasant Creek Drive
Sugar Land, Texas 77478

The undersigned hereby certifies that to the best of his knowledge, information, and belief, the materials specified and incorporated into the project and used during the construction of the project are free of any type of asbestos material.

Sincerely,



J. Gordon Spencer, AIA, RIBA
President
PH: 713.522.1666
FAX: 713.522.6260

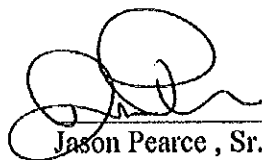
2323 S. SHEPHERD
SUITE 800
HOUSTON, TEXAS 77019
713-522-1666
FAX-522-6260

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ASBESTOS FREE GUARANTEE

PROJECT: FORT BEND MIDDLE SCHOOL # 14
700 PLANTATION DRIVE
RICHMOND, TX 77406

WE HEREBY CERTIFY THAT TO THE BEST OF OUR KNOWLEDGE AND
INFORMATION THE WORK WE INSTALLED IS FREE FROM ANY ASBESTOS,
LEAD OR PCB'S.



Jason Pearce, Sr. Project Manager
Gamma Construction Company

SUBSCRIBED AND SWORN TO ME THIS 21st DAY OF October 2011.

Rebecca Riley
SIGNATURE

MY COMMISSION EXPIRES 08-08-14



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DUROTECH LP
BY: DUROTECH GP, LLC, GENERAL PARTNER

11931 WICKCHESTER LANE, SUITE 300
HOUSTON, TEXAS 77043

CERTIFICATE OF ASBESTOS-FREE CONSTRUCTION - ATTACHMENT "I"

PROJECT NAME: FORT BEND MIDDLE SCHOOL #13 ON BEECHNUT

PROJECT LOCATION: 19001 BEECHNUT, RICHMOND, TEXAS 77469

CONTRACT NO.: 438

We, the undersigned, pursuant to Article 9 of the General and Supplementary Conditions of the Contract for Construction, hereby certify that to the best of our knowledge, information and belief, the materials incorporated into the above named project and identified herein are 100% free from any form of asbestos material:

GENERAL CONSTRUCTION

Specification Section(s).

Specification Section(s).

Specification Section(s).

Specification Section(s).

Specification Section(s).

Specification Section(s).

Specification Section(s).

Specification Section(s).

Specification Section(s).

Specification Section(s).

COMPANY NAME:

DUROTECH LP
11931 WICKCHESTER LANE #205
HOUSTON, TEXAS 77043
Contact: SIDHESH KAKODKAR
Phone: 281-558-6892

SIGNATURE AND DATE:

Phillip D. Irvin

April 3, 2008

PRINT NAME AND TITLE:

Phillip D. Irvin

Senior Vice President

STATE OF TEXAS

COUNTY OF *Harris*

SUBSCRIBED AND SWORN TO BEFORE ME THIS

3rd

DAY OF

April

2008

NOTARY PUBLIC

Melanie Sulak

MY COMMISSION EXPIRES:

5-14-2008

(Notary seal underneath)



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BAY ARCHITECTS

CALVIN E. POWITZKY, JR.
MARK R. FRENCH
BLAIR HAMILTON
PATRICK ZADOW

CERTIFICATE OF ASBESTOS FREE CONSTRUCTION

Fort Bend Independent School District

Macario Garcia Middle School (#9)
18550 Old Richmond Road
Sugar Land, TX 77478

The undersigned hereby certifies that to the best of his knowledge, information, and belief, the materials specified and incorporated into the project and used during the construction of the project are free of any type of asbestos material.

Sincerely,

Mark R. French, AIA, REFP, LEED-AP
Senior Principal

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SHW Group LLP
Architects + Engineers + Planners

20 East Greenway Plaza
Suite 200
Houston, TX 77046
713.877.0900
713.877.0919 Fax
www.shwgroup.com

February 21, 2007

Margaret Manley
Fort Bend Independent School District
16431 Lexington Blvd. #314
Sugar Land, TX 77479
Ph: 713-683-8800

CONSTRUCTION DEPARTMENT
FORT BEND I.S.D.

MAR 7 2007

RE: New Travis High School #10
1111 Harlem Road, Richmond, TX 77469
Fort Bend Independent School District

Dear Margaret:

This letter is to inform you that our plans and specifications for the aforementioned project did not allow for asbestos and lead-based paint. We have also reviewed the shop drawings which, to the best of our knowledge, further indicate that no asbestos and lead-based paint have been incorporated into your facility as part of this Project.

I hope this will clarify the situation for you. If you have any further questions, please give me a call.

Sincerely,

SHW Group LLP



Erin J. Machac
Project Manager

Berkley, MI

Austin, TX

Dallas, TX

Houston, TX

Reston, VA

Your school design partners

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MARSHALL CONSTRUCTION COMPANY

I N C O R P O R A T E D

POST OFFICE BOX 7538 • FORT C. JESTER

FAX (713) 861-4212

HOUSTON, TEXAS 77270-7538

TELEPHONE (713) 861-8163

August 20, 1992

Spencer Herolz Architects
4202 Yoakum
Houston, Texas 77006

Attn: Mr. Ed Sullivan

Re: Walker Station Elementary School. 425

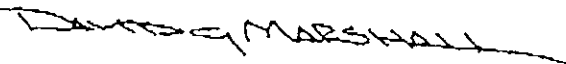
Dear Ed:

For our earlier phone conversations, let this letter serve as written confirmation that, to the best of my knowledge, all materials used in the construction of the above referenced project are asbestos free.

Should you have any further questions concerning this matter, please do not hesitate to contact me.

Yours very truly,

MARSHALL CONSTRUCTION CO., INC.



David G. Marshall

DGM/mh

Copy to: Ms. Margaret Manley
Fort Bend I.S.D.

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FORT BEND ISD - SCOPE OF WORK - PRELIMINARY SCHEDULE

SCHOOL	SCOPE ID	SCOPE	EXPECTED DURATION	Proposed Schedule	SUBSTANTIAL COMPLETION
Austin High School	SID48001	Replace central station air handling units and provide direct digital controls (DDC).	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, AND SUMMER 2027	July-27
	SID48001	Refurbish central station air handling units.	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING	July-27
	SID48002	Replace VAV units on the first and second floor.	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, AND SUMMER 2027	July-27
	SID48021	Replace heating water pumps and provide variable frequency drive (VFD).	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, AND SUMMER 2027	July-27
	SID48028	Replace main shut-off valve near cooling tower.	EXTENDED BREAK	WINTER BREAK 2026	January-27
	SID48034	Provide piping insulation on sprinkler piping in critical areas to prevent from freezing.	AFTER HOURS OR BREAK	SUMMER 2026, OR AFTER HOURS	September-26
Bowie Middle School	SID48013	Refurbish Cooling Tower.	EXTENDED BREAK	HOLIDAY BREAKS 2026	January-27
	SID48016	Replace primary chilled water pumps and provide variable frequency drives (VFDs).	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48017	Replace secondary chilled water pumps and provide variable frequency drives (VFDs).	AFTER HOURS OR BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48022	Replace hot water pumps and provide variable frequency drives (VFDs).	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
Crockett Middle School	SID48020	Replace condenser water piping.	EXTENDED BREAK	SUMMER 2026 OR SUMMER 2027	July-27
	SID48023	Replace hot water pumps and replace variable frequency drives (VFDs).	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48035	Provide piping insulation on sprinkler piping in critical areas to prevent from freezing.	AFTER HOURS OR BREAK	SUMMER 2026, OR AFTER HOURS	September-26
Garcia Middle School	SID48014	Refurbish Cooling Tower.	EXTENDED BREAK	HOLIDAY BREAKS 2026	January-27
	SID48025	Replace condenser water pumps and provide variable frequency drives (VFDs).	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48032	Provide piping insulation on sprinkler piping in critical areas to prevent from freezing.	AFTER HOURS OR BREAK	SUMMER 2026, OR AFTER HOURS	September-26
Hodges Bend Middle School	SID48007	Replace Cooling Tower.	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48024	Replace hot water pumps and replace variable frequency drives (VFDs).	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48030	Install backflow preventer on mainline entering school.	EXTENDED BREAK	WINTER BREAK 2026	January-27
	SID48033	Provide piping insulation on sprinkler piping in critical areas to prevent from freezing.	AFTER HOURS OR BREAK	SUMMER 2026, OR AFTER HOURS	September-26
Travis High School	SID48003	Provide separate HVAC system for the Field House.	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48012	Replace controllers/programming on all CVB boxes. Old controllers no longer available.	EXTENDED BREAK	HOLIDAY BREAKS 2026, SPRING BREAK 2027, OR SUMMER 2027	July-27
	SID48031	Provide piping insulation on sprinkler piping in critical areas to prevent from freezing.	AFTER HOURS OR BREAK	SUMMER 2026, OR AFTER HOURS	July-27
Walker Station Elementary School	SID47036	Provide piping insulation on sprinkler piping in critical areas to prevent from freezing.	AFTER HOURS OR BREAK	SUMMER 2026, OR AFTER HOURS	September-26

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 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 day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Fort Bend Independent School District
16431 Lexington Boulevard
Sugar Land, Texas 77479

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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.

TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
6	DISPUTE RESOLUTION
7	TERMINATION OR SUSPENSION
8	MISCELLANEOUS PROVISIONS
9	ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form 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 agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as 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.
- ☒ A date set forth in a notice to proceed issued by the Owner.
- ☐ Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 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 achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[] Not later than () calendar days from the date of commencement of the Work.

[X] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work

Substantial Completion Date

§ 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 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item

Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item

Price

Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item

Price

§ 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)

Attached as Exhibit E

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

\$1,000.00 per calendar day that substantial completion is delayed.

\$250.00 per day for each calendar day for non-completion of punch list items and contract close-out within 60 days after substantial completion

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

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 ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 22nd day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than Thirty One (31) days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 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 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 may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show 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, 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;
- .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; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 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;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .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; 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 may 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%)

Init.

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 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.)

At the Owner's sole discretion

(Paragraphs deleted)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest in accordance with Chapter 2251 of the Texas Government Code, except when disputed in accordance with Chapter 2251 of the Texas Government Code.

(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

- ☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- ☒ Litigation in a court of competent jurisdiction
- ☐ Other (Specify)

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

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 Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 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:

(Name, address, email address, and other information)

Carolina Fuzetti, MS, PMP
Executive Director, Design & Construction
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, TX 77489
281 634-5592

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

Init.

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User Notes:

(1397578103)

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, 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.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 Attached as Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, as amended by the Owner.
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

- .5 Drawings

Number	Title	Date
Attached as Exhibit D		

- .6 Specifications

Section	Title	Date	Pages
Attached as Exhibit C			

- .7 Addenda, if any:

Number	Date	Pages

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.)

Init.

[] 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:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of 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.)

Exhibit A: Insurance and Bonds
B: CSP Negotiated Items
C: Specifications Table of Contents
D: List of Drawings
E: Unit Prices
F: Warranty Letter

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

Dr. Christie Whitbeck, Superintendent
Fort Bend Independent School District

(Printed name and title)

CONTRACTOR (Signature)

(Printed name and title)

Additions and Deletions Report for AIA® Document A101® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 16:50:02 ET on 03/31/2022.

PAGE 1

Fort Bend Independent School District
16431 Lexington Boulevard
Sugar Land, Texas 77479

PAGE 2

[X] A date set forth in a notice to proceed issued by the Owner.

PAGE 3

[X] By the following date:

...

Attached as Exhibit E

...

\$1,000.00 per calendar day that substantial completion is delayed.

\$250.00 per day for each calendar day for non-completion of punch list items and contract close-out within 60 days after substantial completion

PAGE 4

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 22nd day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than Thirty One (31) days after the Architect receives the Application for Payment.

...

Five Percent (5%)

PAGE 5

At the Owner's sole discretion

~~§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial 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. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:~~

~~(Insert any other conditions for release of retainage upon Substantial Completion.)~~

...

Payments due and unpaid under the Contract shall bear interest ~~from the date payment is due at the rate stated below,~~
or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located, in
accordance with Chapter 2251 of the Texas Government Code, except when disputed in accordance with Chapter
2251 of the Texas Government Code.

PAGE 6

[X] Litigation in a court of competent jurisdiction

...

Carolina Fuzetti, MS, PMP
Executive Director, Design & Construction
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, TX 77489
281 634-5592

PAGE 7

- .2 AIA Document A101™ 2017, Attached as Exhibit A, Insurance and Bonds
 - .3 AIA Document A201™ 2017, General Conditions of the Contract for ~~Construction~~Construction, as amended by the Owner.
- ...

Attached as Exhibit D

...

Attached as Exhibit C

PAGE 8

Exhibit A: Insurance and Bonds
B: CSP Negotiated Items
C: Specifications Table of Contents
D: List of Drawings
E: Unit Prices
F: Warranty Letter

...

Dr. Christie Whitbeck, Superintendent
Fort Bend Independent School District

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, _____, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 16:50:02 ET on 03/31/2022 under Order No. 2114291871 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ – 2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

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BONDING CAPACITY CERTIFICATION LETTER

OWNER

**Fort Bend Independent School District
555 Julie Rivers Drive
Sugar Land, TX 77478
281-634-1803**

CONTRACTOR

Firm Name
Address
City, State, Zip Code
Phone

This letter serves as a certified statement that the Surety Company's authorized bonding capacity for the referenced Contractor will not be exceeded by the inclusion of Contractor's submitted proposal for FBISD's CSP _____, Title of CSP _____.

The present limits on bonding for the referenced Contractor are as follows:

\$ **each occurrence.**
\$ **Aggregate**

Percentage of bonding capacity expended with inclusion of FBISD's CSP _____, Title of CSP%

Amount of ALL projects that the Contractor is currently preparing bid/proposals and/or have not yet been awarded: \$.....

(Amount indicated above must be representative of all projects inclusive of delivery methods such as the following but not limited to: Competitive Bids, Competitive Sealed Proposals, Design-Build, Construction Manager at Risk, Job Order Contracting etc.,)

Issuance and approval of any bond shall be predicated on the most current financial and job information available to the underwriter on the date that the bond is issued. The Surety Company hereby certifies that they are duly authorized by certificate of authority issued by the State of Texas Division of Insurance and that they are rated as follows:

A.M. Best Rating:

Financial Size Category

Notes: This is the only acceptable format for the Surety's Bonding Capacity Certification Letter.

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

*This statement must be notarized (on an original document with an embossed stamp).
Power of Attorney form must be attached.*

SURETY COMPANY

Surety Company Name

Address

City, State, Zip Code

Authorized Signature:

Date: / /

ACKNOWLEDGMENT

State of _____

County of _____

Subscribed and sworn to before me this

_____ **day of** _____ **2024**

My Commission Expires _____

(Notary Seal)



CONFLICT OF INTEREST QUESTIONNAIRE

All vendors doing business with Fort Bend Independent School (FBISD) must complete and submit a Conflict of Interest Questionnaire (CIQ).

FBISD is required to comply with Texas Local Government Code Chapter 176, Disclosure of Certain Relationships with Local Government Officers. Any company that does business with FBISD must complete and submit a Conflict of Interest Questionnaire (CIQ) whether or not a conflict of interest exists.

Statements must be filed within seven (7) business days after the officer becomes aware a conflict of interest exists.

FBISD Board of Trustees include:

Ms. Kristin K. Tassin, President

Mr. Adam Schoof

Dr. Shirley Rose Gilliam

Ms. Angie Hanan

Current Local Government Officers includes:

Kathleen Brown, Deputy Superintendent

Dr. Jaretha Jordan, Deputy Superintendent

Beth Martinez, Deputy Superintendent

Coby Wilbanks, General Counsel

Glenda Johnson, Chief Human Resources Officer

David Rider, Chief of Police

Kwabena Mensah, Chief of Staff

Damian Viltz, Chief Operations Officer

Rhonda Mason , Asst Superintendent Elem

Dr. Stephen Warford, Asst Superintendent Sec

Antignolo Matthew, Exec Dir Child Nutrition

Pandit Payal, Exec Dir Collab Communities Daniel

Bankhead, Exec Dir D & Construction Nunez

Wendy, Exec Dir Elementary Schools Mason

Rhonda, Exec Dir Elementary Schools

Ford Ida, Exec Dir Elementary Schools

Ms. Sonya Jones

Mr. Rick Garcia, Vice President

Mr. David Hamilton, Secretary

Dr. Marc Smith, Superintendent

Dr. Adam Stephens, Chief Academic Officer

kimberly Smith, Chief Communications Officer

Bryan Guinn, Chief Financial Officer

Long Pham, Chief Information Officer Morgan

Aaron, Exec Dir Facilities

Schlacks Kelly, Exec Dir Finance

Amber Williams, Exec Dir HR

Jojo Jacob Exec Dir Info Systems

Christopher Nilsson, Exec Dir Info Tech Service

Dr. Andria Schur, Chief of Schools

Williams Stephanie, Exec Dir Org Development

Elizabeth Williams, Exec Dir Secondary Schools

Lyons-Lewis, Deidra Exec Dir Sec. Schools

Westbrook Pilar, Exec Dir Sel & Comp.Health

Lisa Langston Exec Dir Student Affairs

Hill Deena, Exec Dir Student Supp Svc

Hubbard Melissa, Exec Dir Teach & Learning

Richard Gay, Exec. Dir. Business Services

HOW TO COMPLETE THE CIQ FORM

NO CONFLICT EXIST

If no conflict of interest exists, you MUST:

1. Fill out Box 1
2. Type N/A on Box 3 of the CIQ form
3. Sign and date

CONFLICT EXIST

If a conflict of interest exists, you MUST:

1. Name of person doing business with the District. If the business is a corporation, partnership, etc., then each person who acts as an agent for the business in dealings with Fort Bend ISD must complete the form. Also, state company name. 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.
2. Check the box if you are filing an update to a previously filed questionnaire. Updates are required by law by September 1 of each year in which the person submits a proposal or bid or begins contract discussions or negotiations with the District. Updates are also required by the 7th business day after an event that makes a statement in a previously filed questionnaire incomplete or inaccurate.
3. Name the District employee or school board member with whom you have a relationship, if there is no relationship in question, state "NONE".
4. Answer questions A and B with "Yes" or "No", as applicable.
5. Describe how you are affiliated or related to a FBISD employee or school board member.
6. Check Box if applicable
7. Signature Box: Date and Sign the form. A signature is required from the person completing the form even if "No" is entered in Box 3, A, B, C, or D.

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.

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

Statute / District Required Forms:

- **No Response Form** *(Optional)*
- **Contractor Informational Form** *(Required)*
- **Contractor Questionnaire** *(Required)*
- **Bonding Capacity Certification Letter** *(Required)*
- **Proposal Submission Form** *(Required)*
- **Non-Collusion Certification** *(Required)*
- **Certificate of Residency** *(Required)*
- **Affidavit of Non-Discriminatory Employment** *(Required)*
- **Contractor Certification** *(Required)*
- **Felony Conviction Notification** *(Required)*
- **Vendor Debarment Statement** *(Required)*
- **Conflict of Interest Questionnaire** *(Required)*
- **Certification regarding Lobbying** *(Required)*
- **Confidential Copyrighted Information** *(Required)*
- **Owner(s) Name of Business** *(Required)*
- **Delinquent Taxpayers** *(Required)*
- **Fort Bend ISD Contractor and Subcontractor Participation Form** *(submit with SBE Requirements)*
- **Certificate of Interested Parties** *(Required)*
 - **INSTRUCTIONS for Form 1295 (Certificate of Interested Parties)**
- **Forms Certification** *(Required)*
- **Per Govt. Code 2270.002, written verification that the company does not boycott Israel and will not during the term of the contract** *(Required)*
- **Addendum Acknowledgment Form** *(Required)*

No Response Form *(Optional)*

RETURN ONLY IF YOU CHOOSE NOT TO SUBMIT A RESPONSE TO THIS SOLICITATION

CSP _____

TITLE of CSP _____

Please Print

Whereas on the _____ day of _____, 2024 (print name of company)

has reviewed FBISD's solicitation and elects not to submit a bid:

State Reason for no bid: _____

Street Address

City, State, Zip Code

Telephone/Fax Number

Name of Authorized Individual

Signature of Authorized Individual

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Contractor Informational Form *(Required)*

CONTRACTOR IS:

An Individual

By _____
Individual's Name

A Partnership

Firm Name
By _____
General Partner Authorized to Sign

A Corporation

By _____
Corporation Name

State of Incorporation
By _____
Name of Person Authorized to Sign

Title

(Corporate Seal)

Attest _____
Secretary

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Contractor Questionnaire *(Required)*

Bidder: _____

1. Are you using subcontractors? Yes _____ No _____
2. Have you ever performed work for Fort Bend ISD or other ISDs as a subcontractor? Yes _____ No _____.
If the answer is yes, please provide name of Contractor and Project(s) you were subcontracted to.

3. Can you provide proof of liability and worker's compensation coverage? Yes _____ No _____
4. Did you include the most recent up to date references in this packet? Yes _____ No _____
5. Please include similar projects that you have completed for Texas ISDs in the past 12 months.

PROPOSAL SUBMISSION FORM

CSP _____

Title of CSP _____

Please Print

Whereas on the _____ **day of** _____, **2024**

(print name of company) _____ **has reviewed**

CSP # _____

A copy may be obtained at <http://www.fortbendisd.com/docs/purchasing/general-provisions-for-purchasing-solicitations-and-contracts.pdf> or by contacting the Fort Bend ISD Buyer listed on the cover sheet. Any exception to the terms and conditions must be included in the Proposer's response.

Texas Education Code 44.031(a)(5); Texas Government Code 2269

Purchasing and Acquisition, FBISD Policy CH (Legal)

Purchasing and Acquisition, FBISD Policy CH (Local)

Facilities and Construction, FBISD Policy CV (Legal)

Facilities and Construction, FBISD Policy CV (Local)

Street Address

City, State, Zip Code

Telephone Number

Fax Number

Name of Authorized Individual

Signature of Authorized Individual

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

006000.01 – PROJECT

FORMS Page 5 of 20

Non-Collusion Certification *(Required)*

The undersigned affirms that he or she is duly authorized to execute this questionnaire, that this company, corporation, firm, partnership, or individual has not prepared this submission in collusion with any other person, firm, or entity making or considering making a submission to FBISD for any of the future District projects, and that the contents of this submission as to prices, terms or conditions of said submission have not been communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the official opening of this submission.

The foregoing is true and correct. FBISD, or any authorized representative of FBISD, is authorized by the undersigned to contact any firm, institution, or person listed above to obtain information which FBISD might determine as being desirable.

Firm:

Address:

City/State/Zip:

Phone No:

Fax No:

Signature:

Typed Name:

Date:

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Certificate of Residency *(Required)*

The State of Texas has passed a law concerning non-resident contractors. This law can be found in Texas Government Code under Chapter 2252, This law makes it necessary for FBISD to determine the residency of its proposers. In part, this law reads as follows:

“Section: 2252.001

(3) ‘Non-resident bidder’ refers to a person who is not a resident.

(4) ‘Resident bidder’ refers to a person whose principal place of business is in this state, including a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

Section: 2252.002

A governmental entity may not award a governmental contract to a nonresident bidder unless the nonresident underbids the lowest bid submitted by a responsible resident bidder by an amount that is not less than the amount by which a resident bidder would be required to underbid the nonresident bidder to obtain a comparable contract in the state in which the nonresident’s principal place of business is located.”

I certify that _____
(Name of Company Bidding)

is, under Section: 2252.002, 003 and 004, a

_____ Resident Bidder _____ Non-resident Bidder

My or Our principal place of business under Section: 2252.002, 003, and 004, is in the city of

_____ in the state of _____

Signature of Authorized Company Representative

Print Name

Title

Date

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Affidavit of Non-Discriminatory Employment *(Required)*
(Tracking purposes only)

FORT BEND INDEPENDENT SCHOOL DISTRICT

This company, Contractor, or Subcontractor agrees to refrain from discrimination in terms and conditions of employment on the basis of race, color, religion, sex, or national origin, and agrees to take affirmative action as required by Federal Statutes and rules and regulations issued pursuant thereto in order to maintain and insure non-discriminatory employment practices.

Signature

Printed Name & Title

Company

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Contractor Certification (Required)

Introduction: Texas Education Code Chapter 22 requires entities that contract with school districts to obtain criminal history records on covered employees. Covered employees with disqualifying criminal histories are prohibited from serving at a school district. Contractors must certify to the district that they have complied and must obtain similar certifications from their subcontractors.

Definitions:

Covered individuals: Individual who have or will have continuing duties related to the service to be performed and have or will have direct contact with students. The District will be the final arbiter of what constitutes direct contact with students.

Disqualifying criminal history: (1) a conviction or other criminal history information designated by the District; (2) a felony or misdemeanor offense that would prevent a person from obtaining certification as an educator under Texas Education Code § 21.060, including 19 Tex. Admin. Code §249.16; or (3) one of the following offenses, if at the time of the offense, the victim was under 18 or enrolled in a public school: (a) a felony offense under Title 5, Texas Penal Code; (b) an offense for which a defendant is required to register as a sex offender under Chapter 62, Texas Code of Criminal Procedure; or (c) an equivalent offense under federal law or the laws of another state.

On behalf of _____ (“Contractor”), I certify that
[check one]:

☐ None of Contractor’s employees are *covered individuals*, as defined above. If this box is checked, I further certify that Contractor has taken precautions or imposed conditions to ensure that Contractor’s employees will not become *covered individuals*. Contractor will maintain these precautions or conditions throughout the time the contracted services are provided.

Or

☐ Some or all of Contractor’s employees are *covered individuals*. If this box is checked, I further certify that:

1. Contractor has obtained all required criminal history record information regarding its covered individuals. None of the covered individuals has a disqualifying criminal history.
2. If Contractor receives information that a covered individual subsequently has a reported criminal history, Contractor will immediately remove the covered individual from contract duties and notify the District in writing within three business days.
3. Upon request, Contractor will provide the District with the name and any other requested information of covered individuals so that the District may obtain criminal history record information on the covered individuals.
4. If the District objects to the assignment of a covered individual on the basis of the covered individual’s criminal history record information, Contractor agrees to discontinue using the covered individual to provide services at the District.

Noncompliance or misrepresentation regarding this certification may be grounds for contract termination.

Signature

Date

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Felony Conviction Notification *(Required)*

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.

Vendor's Name:

Authorized Company Official's Name (Printed):

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

Signature of Company Official:

B. My firm is not owned or operated by anyone who has been convicted of a felony.

Signature of Company Official:

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): _____

Signature of Company Official: _____

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Vendor Debarment Statement *(Required)*

I have read the conditions and specifications provided in the bid document attached.

I affirm, to the best of my knowledge, the company I represent has not been debarred or suspended from conducting business with school districts in the State of Texas. This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017, Section 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, Federal Register (pages 4722-4733). Copies of the regulation may be obtained by contacting the Department of Agriculture Agency with which this transaction originated.

NAME OF COMPANY (Please Type)

MAILING ADDRESS	CITY	STATE	ZIP

PREPARED BY (Please Type)

SIGNATURE	TITLE

TELEPHONE NUMBER	FAX NUMBER	DATE

Check here if you have an address or telephone number change: Yes ____ No ____

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Conflict of Interest Questionnaire (Required) COMPLETE AND SIGN EVEN IF NO CONFLICT EXISTS

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person 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 person 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, 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

This section (item 3 including subparts A, B, C & D) must be completed for each officer with whom the vendor has an employment or other business relationship as defined by Section 176.001(1-a), Local Government Code. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes

☐ No

B. Is the vendor of the questionnaire receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer named in this section AND the taxable income is not received from the local governmental entity?

☐ Yes

☐ No

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership of one percent or more?

☐ Yes

☐ No

D. Describe each employment or business relationship with the local government officer named in this section.

Signature of vendor doing business with the governmental entity

Date

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Certification regarding Lobbying *(Required)*

CERTIFICATION FOR CONTRACTS, GRANTS, LOANS, AND COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge and belief, that:

- 1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of a Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- 2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with its instruction.
- 3) The undersigned shall require that the language of this certification be included in the award documents for all sub awards at all tiers (including subcontracts, sub grants and contracts under grants, loans, and cooperative agreements) and that all sub recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, US Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Company

Authorized Representative (Print)

Signature

Date

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Confidential Copyrighted Information (Required)

General Provisions Part III Paragraph 13

FBISD is a governmental body subject to the Texas Public Information Act. Solicitation Responses submitted to FBISD as a result of this Solicitation may be subject to release as public information after contracts are executed or the procurement is terminated. If a Vendor believes that its Solicitation Response, or parts of its Solicitation Response, may be exempted from disclosure under Texas law, the Vendor must specify page-by-page and line-by-line the parts of the Solicitation Response which it believes are exempt. In addition, the Vendor must specify which exception(s) to the Texas Public Information Act are applicable and provide detailed reasons to substantiate the exception(s). Vague or general claims to confidentiality will not be accepted. FBISD assumes no obligation or responsibility relating to the disclosure or nondisclosure of information submitted by Vendor.

By signing below, the Bidder agrees, if a bid is, or parts of bid is confidential, the bidder has specified by stamping in bold letters the term “**CONFIDENTIAL**” on all or the confidential part of the bid. The bid may be considered public information even though all or parts are marked confidential. Furthermore, Bidder agrees a copyrighted bid is unacceptable and will be disqualified as unresponsive.

Company

Authorized Representative (Print)

Signature

Date

Owner(s) Name of Business *(Required)*

Bidder certifies the owner(s) name of the business submitting bid is/are: (Please print name(s) below. If not applicable, please indicate N/A.)

Name

Title

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

Delinquent Taxpayers *(Required)*

In accordance with law, the District shall not enter into a contract or other transaction with a person indebted to the District, nor shall the District award a contract to or enter into a transaction with an apparent low bidder or successful proposer indebted to the District.

☐ I am not a delinquent taxpayer to Ft Bend ISD

☐ I am a delinquent taxpayer to Ft Bend ISD *(your bid may be disqualified if your debt is not cleared prior to award.)*

Signature

Printed Name & Title

Company

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CERTIFICATE OF INTERESTED PARTIES**FORM 1295**

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the goods or services to be provided under the contract.

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary

5 Check only if there is NO Interested Party.

☐**6 AFFIDAVIT**

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said _____, this the _____ day
of _____, 20 _____, to certify which, witness my hand and seal of office.

Signature of officer administering oath

Printed name of officer administering oath

Title of officer administering oath

ADD ADDITIONAL PAGES AS NECESSARY

FBISD CERTIFICATE OF INTERESTED PARTIES – FORM 1295

Certificate of Interested Parties (Form 1295 – must be filled out electronically with the Texas Ethics Commission’s online filing application, printed out, signed, notarized, and attached to vendor’s response to this solicitation.)

Fort Bend ISD (“FBISD”) is required to comply with House Bill 1295, which amended the Texas Government Code by adding Section 2252.908, Disclosure of Interested Parties. Section 2252.908 prohibits FBISD from entering into a contract resulting from this RFP with a business entity unless the business entity submits a Disclosure of Interested Parties (Form 1295) to FBISD at the time business entity submits the signed contract. The Texas Ethics Commission has adopted rules requiring the business entity to file Form 1295 electronically with the Texas Ethics Commission.

“Interested Party” means a person:

- a) who has a controlling interest in a business entity with whom FBISD contracts; or
- b) who actively participates in facilitating the contract or negotiating the terms of the contract, including a broker, intermediary, adviser, or attorney for the business entity.

“Business Entity” means an entity recognized by law through which business is conducted, including a sole proprietorship, partnership, or corporation.

“Controlling Interest” means (1) an ownership interest or participating interest in a business entity by virtue of units, percentage, shares, stock, or otherwise that exceeds 10 percent; (2) membership on the board of directors or other governing body of a business entity of which the board or other governing body is composed of not more than 10 members; or (3) service as an officer of a business entity that has four or fewer officers, or service as one of the four officers most highly compensated by a business entity that has more than four officers.

As a “business entity,” all vendors must electronically complete, print, sign, notarize, and submit Form 1295 with their proposals even if no interested parties exist.

Proposers must file Form 1295 electronically with the Texas Ethics Commission using the online filing application, which can be found at https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm. Proposers must use the filing application on the Texas Ethics Commission’s website to enter the required information on Form 1295. Proposers must print a copy of the completed form, which will include a certification of filing containing a unique certification number. The Form 1295 must be signed by an authorized agent of the business entity, and the form must be notarized.

The completed Form 1295 with the certification of filing must be filed with FBISD by attaching the completed form to the vendor’s solicitation response.

FBISD must acknowledge the receipt of the filed Form 1295 by notifying the Texas Ethics Commission of the receipt of the filed Form 1295 no later than the 30th day after the date the contract binds all parties to the contract. After FBISD acknowledges the Form 1295, the Texas Ethics Commission will post the completed Form 1295 to its website with seven business days after receiving notice from FBISD.

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Forms Certification (Required)

I, the undersigned authorized agent for the company named below, certify that the information concerning notification of felony convictions, Owner(s) Name of Business and Delinquent Taxpayers has been reviewed by me and the information furnished is true to the best of my knowledge. I further certify that I agree to comply with Section 22.0834. Criminal History Record Information Review of Certain Contract Employees, Texas Education Code if awarded a contract through this solicitation, the 31 U.S.C. 6101, note, E.O. 12549, E.O. 12689, 48 CFR 9.404 in relation to the Lists of Parties Excluded from Federal Procurement or Non Procurement Program, and Copyright/Confidential Information.

COMPANY NAME: _____

AUTHORIZED AGENT'S NAME (PRINTED): _____

SIGNATURE OF COMPANY OFFICIAL: _____

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Provision Required in Contract (Govt. Code 2270.002) (Required)

RELATIONSHIPS WITH FOREIGN ENTITIES

During the 85th Legislative Session (2017), the State of Texas enacted two additional requirements affecting all government contracts for goods and services.

All government contracts for goods and services signed after September 1, 2017 must include required provisions from HB 89 (Certification Regarding Israel), and language to implement SB 252 (Verification Regarding Terrorist Organizations).

Therefore, in compliance with HB 89 and SB 252 of the 85th Texas Legislative Session, Contractor agrees that:

In accordance with Texas Government Code Chapter 2252, Subchapter F, Contractor certifies that it is not a company identified on the Texas Comptroller's list of companies known to have contracts with, or provide supplies or services to, the Government of Iran, the Government of Sudan, or a foreign organization designated as a Foreign Terrorist Organization by the U.S. Secretary of State.

Contractor further certifies and verifies that, pursuant to Texas Government Code Chapter 2270, neither Contractor, nor any affiliate, subsidiary, or parent company of Contractor, if any (the "Contractor Companies"), boycotts Israel, and Contractor agrees that Contractor and Contractor Companies will not boycott Israel during the term of Agreement with Fort Bend ISD.

Name of Vendor ("Contractor")

Mailing Address

City

State

Zip

Prepared by

Title

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Addenda Acknowledgement (*Required*)

I acknowledge the receipt of Addenda # ____ through # ____, and my submittal reflects the contents of those addenda.

Name: _____

Signature: _____

Date: _____

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FORT BEND INDEPENDENT SCHOOL DISTRICT

GENERAL PROVISIONS

For Purchasing Solicitations and Contracts

July 1, 2023

The following General Provisions are issued in accordance with the laws, rules, and policies set forth through the Texas Education Code, Chapter 44, and Fort Bend Independent School District (FBISD or "District") policy and may be amended as required by FBISD. Prospective Vendors are cautioned to read and understand the General Provisions set forth in this document prior to responding to a FBISD Solicitation. Any exceptions to or failure to follow these General Provisions unless otherwise directed within the Solicitation, may be cause for a Vendor's Solicitation Response to be deemed non-responsive and disqualified by FBISD. These General Provisions will take precedence over the terms and conditions within the Solicitation when they are in conflict unless specific exception is noted within the Solicitation.

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PART I

DEFINITIONS, TERMS AND ACRONYMS

The following terms may be found in this document or may be used in the normal operations of the District's Purchasing Department.

Term	Definition
Addendum	A document that has been issued by the District that has made material changes, modifications, or deletions of information or specifications of a Solicitation.
Agreement/ Contract	A contract that has been agreed upon and signed by both the District and the Vendor.
Bid	Vendor's response to a Request for Bid or RFB. The term may be used to represent all types of solicitations.
Buyer	The Buyer (FBISD Buyer) is the District's approved business representative for all matters of solicitation, evaluation, award, and administration of a Contract Award. There will be only one appointed Buyer at any time for each purchasing action. Vendors shall address all business/contract issues about a Contract Award to the Buyer.
Alternate or Substitute	A good or service substituted for another by a Vendor with approval of the FBISD Buyer.
Conflict of Interest	A Conflict of Interest shall exist when a Vendor or any affiliated person or business entity provides goods or services under a Contract Award whereby one or more personal, business, or financial interests or relationships exist which would cause a reasonable individual with knowledge of the relevant facts to question the integrity or impartiality of those who are or will be acting under a proposed or existing Contract; or any other facts that exist which may cause the District, at its sole discretion, to determine during the Solicitation or the performance of an existing Contract that the Vendor obtained an unfair competitive advantage favoring the interest of the Vendor or any person with whom the Vendor has or is likely to have a personal or business relationship. Conflicts of interest are further defined in FBISD policy and state law.
Contract Award	The acceptance of a Quote, Bid, Proposal or Offer; a Purchase Order, District Contract Agreement, or other formal notification of award issued by an authorized District official.
Contract Documents	A set of documents that create an Agreement that has been agreed upon and signed by both the District and the Vendor. Contract Documents shall include, without limitation, these General Provisions, the Contract, Purchase Orders, and Service Contracts

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Contract Term	The length of time a Contract or Agreement will be available for use by the District.
Contractor	The Vendor(s) who receive a Contract Award for a specific Solicitation.
Debarment	Action taken by the District which prevents a Vendor from participating in the solicitation process for a period of time, usually as a result of improper business practices on the part of the Vendor.
Deliverable	Goods or services which are required by a Contract Award to be provided to the District by a Vendor.
Discount Contract	An awarded Contract where pricing is based on a firm-fixed discount from a Vendor's published price list, priced catalog, or other document that is published for the majority of the Vendor's customers.
District	FBISD
District Business Day	Days the District is officially conducting business (excludes weekends, District observed holidays, etc.).
District Web Site	The official District web site, available at http://www.fortbendisd.com
FBISD	Fort Bend Independent School District
Line-Item Contract	An awarded Contract where goods or services are specified and individually priced.
Notice of Award	A formal, written document issued by an authorized official of the District's Purchasing Department informing a Vendor that it has been selected for the Contract Award based on its Solicitation Response.
Offer	Term used in conjunction with or in place of a Vendor's Solicitation Response.
Professional Services Contract	A Contract awarded for performance of technical, professional, and/or unique services by Vendors which are typically licensed such as medical or medical arts professionals, architects, engineers, or lawyers, as described in Texas Education Code 44.031(f).
Proposal	Vendor's response to a Request for Proposal (RFP).
Purchase Order	Formal order for goods, materials and/or services from a Vendor; a binding commitment for the District to remit payment to the Vendor after the specified goods and/or services, and an invoice for the same are received by the District.
Quote	Vendor's response to a Request for Quote.
RFB	Request for Bids. Solicitation method used for acquiring goods or services for one-time purchases or establishing Term Contracts for acquiring goods or services with aggregate values of \$50,000 or greater. This solicitation method is formal, and a legal notice is published at time of issuance. This purchasing method is normally used to establish annual contracts for District-wide goods or services, or major one-time purchases. Award is based on Best Value Determination.
CSP	Request for Competitive Sealed Proposal. Solicitation method used primarily for construction projects. Allows for the use of the formal evaluation process and uses the Best Value Determinations for an award. Negotiations are allowed prior to the award.
RFO	Request for Offer. Solely for technology purchases such as those issued through the State of Texas / Department of Information Resources (DIR) procurement processes. May also be used for sale or lease of property belonging to the District.

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RFQ	Request for Quote. Used for small dollar purchases valued at less than \$50,000. Solicitation method is typically informal (e.g., phone, fax or email) and solicitation requirements are minimal (no advertisement, minimal response time, etc.). May be used for one-time purchases, or to establish low-dollar Term Contracts. May also be used to compare contract pricing from several different contract vehicles such as cooperatives.
RFP	Request for Proposal. Solicitation method used to acquire highly technical, negotiated goods or services. Standard RFPs will allow for evaluations based on specific criteria established within the RFP. Used primarily for higher dollar valued purchases but may be used for smaller purchases where requirements warrant this Solicitation method. Negotiations are allowed prior to the award.
School Business Days	Days the District is officially conducting school (excludes weekends, District observed holidays, etc.)
Service Contract	An awarded Contract for performance of a service by a Vendor for a specified period of time.
Solicitation	General term used to refer to an RFB, CSP, RFO, RFQ or RFP.
Solicitation Response	Vendor's response to an RFB, CSP, RFO, RFQ, RFP or other Solicitation issued by the District
Solicitation Tabulation	Official tabulation of Solicitation Responses, issued by the Purchasing Department after Contract Award.
Subcontractor	Company or business that has contracted with the prime contractor for performing services for the District. The prime contractor is responsible to the District for the work performed by its subcontractor(s). No contract will exist between the subcontractor and the District.
Term Contract	An awarded Contract for delivery of goods or performance of services by a Vendor for a specific period of time.
Vendor	Bidder, Vendor, Offeror, Proposer, or Contractor.
Vendors of Record	The compiled bid list of Vendors for a specific Solicitation, that is to include Vendors that were selected to receive the Solicitation or have notified the District that they have an interest in the Solicitation and are added to the initial list of Vendors.

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PART II

SOLICITATION INFORMATION AND INSTRUCTIONS

1. **DISTRICT OVERVIEW**

- 1.1. Fort Bend Independent School District spans over 170 square miles and is located in the northeast part of Fort Bend County, just southwest of Houston and Harris County. FBISD encompasses the incorporated cities of Missouri City, Sugar Land, Arcola, and Meadows Place, a small portion of Houston, and the communities of Clodine, DeWalt, Rosharon, and Fresno.
- 1.2. The District currently has eighty two (82) plus campuses and multiple other sites for administration, athletics, agriculture, and support services.

2. **TYPES OF CONTRACTS** Each Solicitation will identify the type of Contract being advertised. One of the following contracting methods will typically be used, but FBISD reserves the right to use any contracting method it deems to be in the best interest of the District:

2.1. ***Firm-Fixed Price***

- 2.1.1. Prices shall be firm fixed for the term specified in the Contract, and all extensions exercised by the District.
- 2.1.2. No increases will be allowed during the Contract term.
- 2.1.3. Price decreases are acceptable at any time during the term of the Contract.

2.2. ***Fixed-Price with a Price Adjustment Allowance***

- 2.2.1. Prices shall be firm for a term specified in the Contract.
- 2.2.2. Prices can be adjusted based on escalation provisions as identified in the Contract.
- 2.2.3. The District reserves the sole right to evaluate the applicability of any price adjustment and accept or reject any formula included in any Solicitation Response or accept or reject any Solicitation Response containing a price adjustment proposal.
- 2.2.4. FBISD recognizes this product or service has a price component that may have a commodity with changing costs. The Contractor/Supplier may request a Price Adjustment no more frequently than once each quarter (3-month period).
- 2.2.5. A Price Adjustment request must be made in writing and include the reason for the request, documentation supporting the request (i.e., commodity increases), the current pricing, and the requested revised pricing. FBISD will review the Price Adjustment request. If the Price Adjustment is deemed reasonable the Price Adjustment request will be accepted by written acknowledgement. If the request is not accepted the FBISD may entirely reject the request or may counter with revised pricing. In either case the FBISD will provide a written explanation in support of the decision. The Director of Procurement Services may use available indexes (e.g., CPI or PPI) to determine if the requested Price Adjustment is reasonable. Typically, a Price Adjustment that exceeds 5% will not be approved unless very unusual and significant changes have occurred in the industry.
- 2.2.6. In the event industry costs decline, FBISD shall have the right to request to receive, from the Contractor, a reasonable reduction in prices/pricing that reflect such cost changes in the industry. FBISD will make a written request to the Contractor for a Price Adjustment in writing with supporting documentation.

2.3. ***Firm-Fixed Discount Percentage, Discount-from-List, or Cost Markup-From-List***

- 2.3.1. Discount or cost mark-up shall be firm fixed for the period specified in the Contract, but prices may vary based upon changes in a District approved price list or other pricing document, by the method and frequency as identified in the Contract.
- 2.3.2. Used when the pricing is based on a discount or a cost-plus mark-up percentage from an established, publicly recognized price list.
- 2.3.3. Prices shall be from a current Vendor's price list or a cost-plus percentage add-on to a Vendor's distributor/producers price list.
- 2.3.4. Vendor's price list shall be the current price list published and available to and recognized by the trade. A price list specially prepared for a given Solicitation will not be accepted. FBISD, in its sole discretion, shall determine the acceptability of such price lists.

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- 2.3.5. Unless otherwise indicated within the Solicitation, the period of acceptance shall be no earlier than one-twenty (120) District Business Days from receipt and approval.
- 2.3.6. In order for a price list to be changed, if permitted by the Contract terms, a new or amended price list must be submitted to the District's Purchasing Department by the Vendor and approved in writing by the FBISD Buyer within the Contract time specified prior to the requested price change. Otherwise, the last FBISD approved price list remains in effect until such time that FBISD approves the price change. Price changes will not be approved without vendor's documentation supporting cause for increase.
- 2.3.7. All prices and discount percentages in Vendor's response shall be firm for the term of this Contract. All price changes for products and/or services provided under this Contract must be approved, in writing, by FBISD prior to taking effect and in the same format as was accepted in Vendor's original response.
- 2.3.8. If the Solicitation includes the option to extend for additional year(s), price increases for each additional year may be negotiated not to exceed the Consumer Price Index (CPI) in the FBISD area at the time of renewal. Prices may be negotiated to prices below the current pricing.
- 2.3.9. Vendor agrees to promptly lower the proportionate price of any product purchased through this Contract following a reduction in the price the Vendor is paying suppliers.
- 2.3.10. Prices for this type of Contract cannot be increased during the first year of the contract. For periods beyond year one, prices cannot be increased for 30 days after the Contract renewal commences unless otherwise specified in the Solicitation. Price reductions shall be offered immediately upon becoming available to a Vendor at any time after award.

The following documentation shall be provided to support a request for a price change:

- justification for change/increase
- terms and conditions
- market conditions
- manufacturers'/distributors' impact if any

All price decreases shall be allowed for all products and/or services.

2.3.11. Pricing, Purchase Orders, Invoices, and Payments

If pricing for products or services available under this Contract are provided at a lower price to an eligible Customer who is not purchasing those products or services under this Contract or any other entity or consortia authorized by Texas law to sell said products and services to eligible Customers, then the available Customer Price in this Contract shall be adjusted to that lower price. This requirement applies to products or services quoted by Vendor or its resellers under this contract for a quantity of one (1) under like terms and conditions and does not apply to volume or special pricing purchases. This Contract shall be amended within ten (10) business days to reflect the lower price.

3. CONFLICT OF INTEREST

3.1. *Disclosure of Certain Relationships with Local Government Officials*

- 3.1.1. Any individual or business entity that contracts or seeks to contract for the sale or purchase of property, goods, or services with FBISD must file a Vendor Conflict of Interest Questionnaire with the FBISD Purchasing Office in accordance with Texas Local Government Code Chapter 176, and in the event that a conflict arises, no later than the 7th business day after the recipient becomes aware of facts that require filing.
- 3.1.2. This requirement applies to a person who is an agent of a vendor in the Vendor's business with the District. The Texas Ethics Commission's website at: www.ethics.state.tx.us/data/forms/conflict/CIS.pdf

3.2. *Employee*

- 3.2.1. Pursuant to FBISD Policy CH (Local) Purchasing and Acquisition, and DBD (Local) Employment Requirements and Restrictions, all Vendors must disclose the name of any FBISD employee who owns, directly or indirectly, an interest in the Vendor's firm or any of its branches.
- 3.2.2. Failure to provide such conflict-of-interest information may be grounds for disqualification of the Solicitation Response or cancellation of a contract resulting from this Solicitation.
- 3.2.3. Purchase of services or equipment from a business owned in whole or in part by a District employee shall be permitted only when approved by the Superintendent and executed through a documented competitive process.

4. SOLICITATION PRICING Solicitation prices must be firm for one hundred twenty (120) days from Solicitation

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opening/bid closing date until award unless otherwise specified in the Solicitation.

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5. **QUANTITIES** Any quantities listed within the Solicitation are a close approximation based on requirements and available funds, but FBISD reserves the right to purchase more or less than the estimated quantities, at the current Contract price, for the term of the agreement unless otherwise specified in the Solicitation. Unless otherwise agreed in writing, FBISD will engage Contractor on an “as needed if needed” basis and does not guarantee the purchase of any quantity or dollar amount of Services.
6. **REQUEST FOR EXPLANATION / INTERPRETATION**
 - 6.1. Any explanation desired by a Vendor regarding the meaning or interpretation of this Solicitation must be submitted in writing to the Buyer identified in the Solicitation in accordance to the Solicitation instructions , in order to allow a response to all interested Proposers before the submission of a bid.
 - 6.2. The District has provided an email address or method of communication intended for interested Proposers to direct requests for clarification, interpretations, and/or questions of current Solicitations in each respective solicitation.
 - 6.3. All requests must include all contact and Solicitation information to be considered. Failure to provide this information may delay a response from the District. Any interpretations, corrections, additions, or changes to the Solicitation will be communicated to all interested Vendors through the issuance of an Addendum. It is the responsibility of the Vendors, prior to submitting their Solicitation Response, to determine whether an Addendum has been issued. All Vendors shall comply with the requirements specified in any Addendum(a) issued by the District.
 - 6.4. Once a request is received, a notification of receipt by the District will be forwarded to the Vendor’s contact email address.
7. **DELIVERY TERMS**
 - 7.1. All goods or products included in the Solicitation shall be F.O.B. (“Free on Board”) destination full freight allowed, unless otherwise indicated within the Solicitation.
 - 7.2. All goods or products will be considered full freight prepaid and allowed and included in the unit price.
8. **SUPPLIER DIVERSITY INITIATIVE** The FBISD Supplier Diversity Initiative (SDI) ensures that the District will use its best efforts to encourage small businesses to participate in current and future purchasing of all goods and services.
 - 8.1. ***Program Definitions***
 - 8.1.1. *“Small Business”* is defined as a business entity which is independently owned and operated, and which is not dominant in its field of operation. The business employs less than 50 employees and/or has less than \$3 million in annual business volume from this local operation.
 - 8.2. ***Certification***
 - 8.2.1. Any business wishing to be identified by FBISD as a small business shall be certified as such by the:
 - 8.2.1.1. Port of Houston Authority SBE Certification.
 - 8.2.1.2. Metropolitan Transit Authority of Harris County (METRO) SBE Certification.
 - 8.2.1.3. City of Houston SBE Certification; or
 - 8.2.1.4. Small Business Administration - SBA 8A (if authorized by the District for a particular procurement).
9. **SAMPLE REQUIREMENTS**
 - 9.1. The District may require a sample of a product at any time for evaluation and testing, from a Vendor participating in a Solicitation process or a Vendor supplying items to the District under contract.
 - 9.2. The Vendor should not submit a sample with the Solicitation Response unless directed to do so.
 - 9.3. ***Request of Sample***
 - 9.3.1. If it is determined that a sample is required as part of the Evaluation Process, the requirement will be issued in writing to the Vendor by the Buyer.
 - 9.3.2. Samples must be received by the District’s Purchasing Office by the deadline established in the Buyer’s written notification.
 - 9.3.3. A representative sample of the item(s) offered must be provided. Award recommendations will be based on samples and any future items ordered will be of the same quality and grade of the sample submitted.
 - 9.3.4. The Vendor will cover all costs in shipping and providing the sample product to the District.
 - 9.3.5. Failure to provide a requested sample may disqualify the Vendor from further consideration in

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award of the associated Solicitation item.

- 9.3.6. If a sample is found to not meet the Solicitation specifications or the intended purpose of the product, the associated Solicitation item will be disqualified.

9.4. ***Sending of Samples***

- 9.4.1. If a sample is required by the District, samples must be clearly marked with the following information:

- 9.4.1.1. The word "Sample" in large print;
- 9.4.1.2. The name of the company submitting the sample; and
- 9.4.1.3. The number and title of the Solicitation or Contract.

9.5. ***Return of Samples***

- 9.5.1. Unless specifically requested, all samples provided shall become the property of FBISD.
- 9.5.2. If the sample is required by the Vendor to be returned, any and all costs associated with the return of the sample will be the responsibility of the Vendor. FBISD shall not be liable for any damage to the sample.

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PART III
SOLICITATION RESPONSE

1. **PREPARATION OF A SOLICITATION RESPONSE** In preparation of a Solicitation Response, each Vendor shall:
 - 1.1. Furnish all information required by the Solicitation by the due date and time.
 - 1.2. Authorized Signature
 - 1.2.1. Solicitation Responses must be signed and/or submitted only by individuals who have been given authority to bind the Vendor under contract.
 - 1.3. Have all erasures or other changes initialed by the signer of the Solicitation Response.
 - 1.4. Solicitation Responses submitted on other forms or with different terms or provisions may be deemed non-responsive by FBISD and disqualified.
 - 1.5. Unless otherwise instructed by the Solicitation, Vendors shall submit the lowest and best price, F.O.B. destination, freight prepaid and allowed, on each item, including packaging and transportation.
 - 1.6. An unsigned Solicitation Response will be deemed non-responsive by FBISD and disqualified. Solicitation Responses cannot be signed after the Solicitation opening time even though the Vendor or a representative is present at the Solicitation opening.
 - 1.7. By submitting a proposal vendor you are acknowledging that you agree to the terms and conditions of the proposal and incorporated here by reference. An unsigned Solicitation Response will be deemed non-responsive by FBISD and disqualified. Solicitation Responses cannot be signed after the Solicitation opening time even though the Vendor or a representative is present at the Solicitation opening.
 - 1.8. By submitting a proposal vendor agrees to any Terms & Conditions of this solicitation and in case of
 - 1.9. conflict with other documents provided by the vendor, these Terms and Conditions take precedence and prevail unless specifically identified and changes are signed by both parties.
 - 1.10. All Solicitation Responses and accompanying samples or documents of any kind become the property of FBISD and are subject to the Texas Public Information Act The District will be under no obligation to return any part of a Solicitation Response to a Vendor.
2. **ADDENDA**
 - 2.1. Should an addition or correction become necessary after a Solicitation is issued, an Addendum or notice of the availability of such an Addendum will be posted on the District e-bidding Web Site <https://fortbendisd.bonfirehub.com/portal/openOpportunities>. Vendors of Record with FBISD are those Vendors having received a copy of the initial Solicitation or notice of the availability of a copy on-line.
 - 2.2. Vendors who do not submit a Solicitation response without receipt of all Addenda issued, may be deemed non-responsive by FBISD, and disqualified.
 - 2.3. Vendors shall acknowledge an Addendum by returning the Addendum in a separate response, or with the Solicitation, or by physically noting the change or addition on the Solicitation Response with a notation acknowledging the Addendum.
 - 2.4. Failure to return or acknowledge an Addendum may be deemed non-responsive by FBISD and result in disqualification.
3. **BRAND NAME AND PRODUCT NUMBER REFERENCE**
 - 3.1. If applicable to the Solicitation, the use of referenced brand/stock numbers in a Solicitation are for brevity in establishing minimum specifications and are not intended to be restrictive.
 - 3.2. "Buyers approved equal" indicates that the District will consider other manufacturer's product that meets or exceeds the published specifications. The District shall make the final determination of acceptable substitutions.
 - 3.3. Unless no exception is made to the reference manufacturer's product, the alternate manufacturer, trade and/or brand name and number must be indicated for each item bid. The Bidder will be required to forward any illustrations that render its equivalency. Any additional specifications must reference the line-item number that it corresponds to.
 - 3.4. Products of inferior quality will be rejected.
 - 3.5. If the bid space is left blank, the District will consider it a 'no bid'.
4. **ATTACHMENTS**
 - 4.1. Vendors may include attachments to describe goods or services being offered and/or to exhibit that products offered meet all written specifications; however, Vendors shall not submit samples unless requested to do so.
 - 4.2. Page and paragraph numbers shall properly reference each page of an attachment in the Solicitation

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4.3. The name of the Vendor submitting the attachment shall also be prominently displayed on each page of the attachment.

4.4. No terms or conditions recorded on any attachment will be considered binding unless specifically made a part of the Solicitation Response in writing and specifically incorporated into the resulting contract.

4.5. ***WARNING: Any added terms or conditions may result in disqualification of a Solicitation Response, e.g., Solicitation Responses subject to laws of a state other than Texas, requirements for prepayment, limitations on remedies, waiver of immunities, change in venue, etc.***

5. **SITE VISITATION**

5.1. The Vendor shall be responsible for fully understanding the scope of the Solicitation, and if considered applicable to the goods or services being solicited, the District recommends that Vendors visit the FBISD site and examine the space and/or equipment to be serviced. Vendors shall obtain prior FBISD Buyer approval for any site visit.

5.2. Pre-submittal conferences may be established by the District to allow Vendors access to the associated facility.

5.3. The prospective Vendor shall carefully examine the venue(s), specifications, and requirements.

5.4. If necessary, Vendors shall secure additional information from the FBISD Buyer that may be requisite to a clear and full understanding of the work.

6. **REFERENCES**

6.1. If required in the Solicitation, the Vendor is to submit references that have contracted with their company to provide like products or services. It is recommended that the Vendor include school districts or other local government organizations similar to FBISD in size and structure as references, if possible. References should include the company name, address, contact name, phone number and email address.

6.2. The District reserves the right to use the results of the reference check in the evaluation process, including information obtained from references other than those identified by the Vendor. A negative reference or references may cause a Solicitation Response to be rejected.

7. **CERTIFICATIONS AND REPRESENTATIONS**

7.1. The Vendor shall complete, sign and provide all documents as required by the Solicitation. Document must be signed by an authorized representative who may legally bind the company and is to be included with the Solicitation Response for the response to be considered. Failure to sign and submit required documents may disqualify the Solicitation Response

7.2. Based on the type of Solicitation, the forms that may be required are:

7.2.1. **Felony Conviction Notice.** State of Texas Education Code, Section 44.034 requires that a person or business entity (excluding publicly held corporations) that enters into a Contract with the District give advance notice to the District if the person or an owner or operator of the business entity has been convicted of a felony.

7.2.2. **Proposal Submission Form (Proposals only).**

7.2.3. **Conflict of Interest Disclosure.** Prior to and as a condition of doing business with FBISD, Vendor shall complete a Conflict-of-Interest Disclosure Form, and shall disclose any business relationship, past or present, with a sitting Board member or FBISD employee. Failure to disclose the existence of any such relationship may disqualify the Solicitation Response or be grounds for termination of an award or agreement.

7.2.4. **Relationships with Foreign Entities.**

7.2.4.1. In accordance with Texas Government Code Chapter 2252, Subchapter F, Vendor shall certify that it is not a company identified on the Texas Comptroller's list of companies known to have contracts with, or provide supplies or services to, the Government of Iran, the Government of Sudan, or a foreign organization designated as a Foreign Terrorist Organization by the U.S. Secretary of State.

7.2.4.2. Vendor shall certify, pursuant to Texas Government Code Chapter 2270, neither Vendor, nor any affiliate, subsidiary, or parent company of Vendor, if any (the "Vendor Companies"), boycotts Israel, and Vendor agrees that Vendor and Vendor Companies will not boycott Israel during the term of any award or agreement.

7.2.5. **W-9 Certificate.** The Vendor is required to register in Bonfire and upload a copy of a W-9 Vendor Identification Number Certificate to expedite the payment process if awarded a Contract. A copy of the form can be found at <https://www.irs.gov/forms-pubs/about-form-w-9>.

7.2.6. **If you have previously submitted your W9, you are required to submit an updated version if there are**

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any changes.

7.2.7. Suspension and Debarment Certification

7.2.8. EDGAR Certifications

7.2.9. Data Protection Addendum This document is required for Solicitations that involve the District's data

7.2.10. Vendor ACH/Direct Deposit Authorization Form will be requested if awarded a Contract.

7.2.11. Certification Regarding Lobbying

This certification is a prerequisite for making or entering into a transaction imposed by Section 1352, Title 31, US Code.

7.2.12. Certificate of Residency

Texas Education Code Chapter 2252, Subchapter A addresses non-resident contractors. As a result, Fort Bend ISD obtains this form as part of the Solicitation Response to determine the residency of its proposers.

8. **SUBMISSION OF SOLICITATION RESPONSES**

8.1. A Solicitation Response shall represent a true and correct statement and shall contain no cause for claim of omission or error.

8.2. If directed by the Solicitation, the Vendor shall provide any and all certifications, forms, and documents as stated within the Solicitation.

8.3. Responses

8.3.1. Solicitation Response must contain:

8.3.1.1. The signed proposal document page of the Solicitation;

8.3.1.2. Specification documents, if applicable;

8.3.1.3. The certifications and representations as applicable;

8.3.1.4. Any additional documents required by the Solicitation.

9. **WITHDRAWAL OF A SOLICITATION** Any Vendor who, in FBISD's sole discretion, is extended the privilege of withdrawing a Bid because of having proven mechanical error in the Solicitation Response may not be considered for an Award on similar items for a length of time deemed appropriate by the District, usually considered to be one (1) year or longer.

10. **SOLICITATION RESPONSE CERTIFICATION** By signing and submitting a Solicitation Response, the Vendor certifies and represents to FBISD that:

10.1. The Solicitation Response has been reviewed by an authorized representative of the company or firm submitting the bid, proposal, offer or other Solicitation Response document.

10.2. The Vendor's firm or any of its individuals have not colluded, conspired, connived or agreed, directly or indirectly, with an entity or person, to put in a sham Solicitation Response or bid or to refrain from responding to the Solicitation, and have not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix its Solicitation Response price, or that of any other vendor, or to fix any overhead, profit or cost element of said Solicitation Response price, or of that of any other Vendor, or to secure any advantage against FBISD or any person interested in the Solicitation, and that all statements in its Solicitation Response are true;

10.3. The contents of the Solicitation Response as to price, terms and conditions or other details of the Solicitation Response have not been communicated by the Vendor or by any employee or agent to any other person engaged in this type of business prior to the official opening of the Solicitation; and

10.4. Vendor has read and understands the Solicitation and these General Conditions (including without limitation, the Contract Terms, Conditions, and Requirements set forth in Part V, below).

11. **LATE SOLICITATION RESPONSES**

11.1. Late Solicitation Responses, or components of a solicitation response, will **NOT** be considered under any circumstances.

11.2. A Solicitation Response will be considered late if the Solicitation Response is not received at the Purchasing Department Solicitation Response Desk by the deadline provided in the Solicitation.

11.3. The Purchasing Department will not be responsible for, and no allowances will be made for, misrouting of a Solicitation Response within the District, delays caused by the Post Office, technical delays or problems, courier services, or any other delays.

11.4. The official deadline date and time is determined by the Purchasing Department.

12. **THE DISTRICT IS TAX-EXEMPT**

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12.1. FBISD is tax-exempt. Proposal prices should not include taxes.

13. **OPEN RECORDS POLICY**

13.1. FBISD is a governmental body subject to the Texas Public Information Act. Solicitation Responses submitted to FBISD as a result of this Solicitation may be subject to release as public information after contracts are executed or the procurement is terminated. If a Vendor believes that its Solicitation Response, or parts of its Solicitation Response, may be exempted from disclosure under Texas law, the Vendor must specify page-by-page and line-by-line the parts of the Solicitation Response which it believes are exempt. In addition, the Vendor must specify which exception(s) to the Texas Public Information Act are applicable and provide detailed reasons to substantiate the exception(s). Vague or general claims to confidentiality will not be accepted. FBISD assumes no obligation or responsibility relating to the disclosure or nondisclosure of information submitted by Vendor.

14. **INTERPRETATION**

14.1. A Solicitation represents the basis for any Award and supersedes all prior offers, negotiations, exceptions and understandings (whether orally or in writing). Submitted Solicitation Responses should be self-explanatory and should not require any clarification or additional information.

15. **SOLE SOURCE**

15.1. In order to become a Sole Source Vendor, a Vendor must meet the requirements of Texas Education Code § 44.031(j) Sole Source, as described below.

15.1.1. Selected purchases may be exempt from competitive procurement if they meet the established criteria for a sole source purchase:

15.1.1.1. Identification and confirmation that competition in providing the item or product to be purchased is precluded by the existence of a patent, copyright, secret process or monopoly

15.1.1.2. Identification and confirmation that the product is a film, manuscript, book, utility service (including electricity, gas, or water), or a captive replacement part or component for equipment.

15.1.1.3. Sole source does not apply to mainframe data-processing equipment and peripheral attachments with a single item purchase price in excess of \$15,000.

15.2. It is incumbent upon the District to obtain and retain documents from the Vendor which clearly delineate the reasons that qualify the purchase to be made on a sole source basis. In order to do business with FBISD as a Sole Source Vendor, FBISD must receive a notarized Sole Source Affidavit along with proof of Vendor's company qualifying as a sole source.

16. **GENERAL CORPORATE AND CONTACT INFORMATION**

Vendors are required to attach all the following in the Solicitation Response:

- Describe the company's official registered name and its principals.
- Provide a brief history of the company, including the year it was established.
- Provide the company's organizational chart.
- Provide the company's Dun & Bradstreet (D&B) number.
- Provide a description of the company's relevant market and the company's position within it.
- State whether the Vendor or the Vendor's ultimate parent company or majority owner: (A) has its principal place of business in this state; or (B) employs at least 500 persons in this state.
- Vendor agrees to provide the District with the following financial information if requested by FBISD at any point during the procurement process, including before or after contract award: If public, the Vendor's income statement, balance sheet, and cash flow for the past three (3) years; if private, the Vendor's audited financial statements for the past two years (if available). A Vendor's failure to provide this financial information may impact the FBISD administration's recommendation to the FBISD's Board of Trustees for the award of the contract.

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PART IV

SOLICITATION EVALUATION AND AWARD

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1. **RESERVATIONS** The District expressly reserves the right to:
 - 1.1. Waive minor deviations from specifications, if the District determines that overall cost of the goods or service will be lower and the overall function is improved or not impaired;
 - 1.2. Waive any minor informality or deficiency in any Solicitation procedure;
 - 1.3. Accept, reject, or negotiate modifications in any terms of a proposed Vendor's Solicitation Response, or any parts thereof;
 - 1.4. Waive any formalities or technicalities if deemed in the best interest of the District;
 - 1.5. Reject any or all Solicitation Responses;
 - 1.6. Cancel the Solicitation;
 - 1.7. Reissue a Solicitation;
 - 1.8. Extend the Solicitation opening time and date, the Contract Award date, or both;
 - 1.9. Specify approximate quantities;
 - 1.10. Increase or decrease the quantity specified in the Solicitation;
 - 1.11. Consider and accept alternate Solicitations, if specified in the Solicitation, when it is considered in the best interest of the District;
 - 1.12. Procure any goods or services by other means;
 - 1.13. Purchase no goods or services;
 - 1.14. Award one or more contracts, in part or in whole, to a single or to multiple prospective Vendors. The decision to award multiple contracts, award only one contract, or to make no awards rests solely with FBISD. FBISD may make multiple awards, and this fact should be taken into consideration by each Vendor;
 - 1.15. Award contracts for individual products or services as may appear advantageous;
 - 1.16. Negotiate separately in any manner necessary to serve the best interests of the District; and
 - 1.17. Be sole judge of quality and equality.
 - 1.18. FBISD assumes no financial responsibility for any costs incurred by prospective Vendors in developing and submitting a Solicitation Response, participating in bid conferences (if any), participating in any negotiation sessions or discussions, or any other costs incurred by Vendors prior to award of a contract pursuant to any Solicitation.
 2. **COMPETITIVE SELECTION USING BEST VALUE**
 - 2.1. **Solicitation**
 - 2.1.1. All formal Solicitations will be evaluated using the Best Value method as defined in Texas Education Code 44.031(b).
 - 2.1.2. The Solicitation will usually indicate the criteria and ranking to be used to determine Best Value. In the absence of criteria in the Solicitation, the criteria in 2.1.3 will be used.
 - 2.1.3. In determining Best Value the District will consider any or all of the following:
 - 2.1.3.1. Purchase price;
 - 2.1.3.2. Reputation of the Vendor and of the Vendor's goods or services;
 - 2.1.3.3. Quality of the vendor's goods or services;
 - 2.1.3.4. Extent to which the goods or services meet the District's needs;
 - 2.1.3.5. Vendor's past relationship with the District;
 - 2.1.3.6. Total long-term cost to the District to acquire the Vendor's goods or services;
 - 2.1.3.7. Any other relevant evaluation criteria specifically listed in the Solicitation;
 - 2.2. **Award**
 - 2.2.1. Award will not necessarily be made to the Vendor submitting the lowest priced offer.
 - 2.2.2. After Solicitation Responses are received, FBISD may make an Award or Awards without discussion with any Vendor. FBISD reserves the right to conduct interviews, oral presentation, negotiations if applicable, or any other requirements deemed appropriate with only one, with some, or with all Vendors, in compliance with applicable procurement laws. Solicitation Responses should, therefore, be submitted on the most favorable terms.
 3. **EVALUATION** The District will evaluate all Solicitations based on the following procedures:
 - 3.1. **Objective** Objective evaluation is:

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- 3.1.1. Based on a set of pre-determined criteria using formulas and/or sets of ranges; and
- 3.1.2. By normal District processes, does not include an evaluation team.
- 3.2. **Subjective** Subjective evaluation is:
 - 3.2.1. Based on a set of pre-determined criteria; and
 - 3.2.2. By normal District processes, includes the use of an evaluation team to determine the scoring.

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4. **AWARD OF CONTRACT**

- 4.1. FBISD will indicate acceptance of a Vendor's Solicitation Response by issuance of a Purchase Order, Contract, or other form of Notice of Award to awarded Vendor(s) at completion of the evaluation of Solicitation Responses and upon approval by the Board of Trustees.
- 4.2. If the Contract is issued in the form of a Purchase Order, the Purchase Order together with any other documents which the FBISD Buyer has attached and/or referenced as part of the Purchase Order, constitutes an offer by the FBISD Buyer to purchase from the Vendor the goods and/or services indicated, subject to these General Provisions. The Purchase Order, together with these General Provisions, and their attachments and/or referenced documents, is the sole and complete Contract between the District and Vendor with respect to the goods and services ordered and supersedes all prior oral and written understandings. No additional terms or modifications to the Purchase Order proposed by the Vendor in any acknowledgement, sales order, or other form of communication shall be binding on the District. The FBISD Buyer's failure to object to provisions contained in any communication from the Vendor shall not be deemed a waiver of the provisions or an approval of the terms.
- 4.3. Acceptance of the Purchase Order is conditional on Vendor's consent to the terms and conditions in these General Provisions. FBISD expressly objects to and rejects any terms or conditions in addition to or different from those contained in these General Provisions, whether previously or hereafter proposed in any form from Vendor unless the FBISD Buyer has expressly agreed to them in writing. By submitting a Solicitation Response to the District to provide goods or services, Vendor acknowledges receipt and willingness to accept all terms and conditions contained in these General Provisions.
- 4.4. ***Order of Precedence***
 - 4.4.1. If a formal Contract, Agreement or Purchase Order is issued, the terms and conditions of the Contract shall be governed in the following order of importance/precedence:
 - 4.4.1.1. The formal Contract, Agreement, or purchase order;
 - 4.4.1.2. These General Provisions;
 - 4.4.1.3. Any Addenda to the Solicitation submitted prior to the opening of the Solicitation;
 - 4.4.1.4. The original Solicitation;
 - 4.4.1.5. The accepted portions of the Vendor's Solicitation Response; and
 - 4.4.1.6. Any subsequent contractual documents agreed upon by both parties.
 - 4.4.2. Failure to accept this obligation may result in the cancellation of any award;
 - 4.4.3. Any damages suffered by the District as a result of the Vendor's failure to Contract shall be recovered from the Vendor.
- 4.5. ***Partnership and/or Subcontracting*** If the Vendor has joined with one or more business partners or is Subcontracting any work to respond to the Solicitation, FBISD reserves the right to:
 - 4.5.1. Reject the Vendor's offer based on that/those partnerships(s) and/or Subcontractors.
 - 4.5.2. Accept, at its option, subsequent offers with new partnership(s) and or Subcontractors, should the Subcontracting Vendors in the initial offer be unacceptable for any reason.
- 4.6. ***Multiple Vendors*** FBISD reserves the right to award Contracts to multiple Vendors if such Vendors offer items that are unique and have value to FBISD.
- 4.7. ***Formation of Contract*** A response to a Solicitation is an offer to contract with FBISD based upon the terms, conditions, scope of work, and specifications contained in the Solicitation and in these General Provisions. A Solicitation Response does not become a contract unless and until it is accepted and executed by FBISD.

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PART V

CONTRACT TERMS, CONDITIONS, AND REQUIREMENTS

1. GENERAL TERMS

1.1. Titles The awarded Vendor shall be hereby known in the section as "Contractor".

1.2. Term of Contract, Renewals and Extensions

1.2.1. The Contract established by the Contract Award shall be in effect from date of award or the commencement date, whichever is later, and shall continue for the term stated in the Contract. Typically, the base term is one year.

1.2.2. Any Purchase Orders dated during the term of the Contract must be honored even if received after the Contract expiration date. Contractors may not specify a "final order" receipt date.

1.2.3. Pricing is established by the date the order is placed unless otherwise stated in the Contract.

1.2.4. Renewal Contracts. In addition to the initial base contract term, the District shall have the right to renew the contract for a period described in the official solicitation. Renewals may be offered for additional terms (for example, one-year base term + 4 one-year renewals = 5/years total) provided both FBISD and Vendor are in mutual agreement.

1.2.5. Short Term Contract Extension.

1.2.5.1. If the District determines that additional time is required to avoid a Contract lapse, it may, at its sole option, extend the Contract in 30-day increments, up to 180 days, under the current Contract pricing, terms and conditions.

1.2.5.2. Such extension will be done in writing prior to the end of the current Contract term.

1.3. Price Escalations The prices in Contractor's Solicitation Response shall be firm for the term of the Contract. The District shall only allow price escalations within a Contract if such provisions were identified within the original Solicitation. Contract renewals will allow for escalation only at the time of renewal and Contractor must submit price escalation, along with a justification for such increase, on manufacturer's letterhead, using the same format used in Contractor's Solicitation Response. District shall review escalation amount and determine if escalation is acceptable or not. All price changes shall be subject to the District's prior written approval.

1.4. Availability of Funds

1.4.1. Any Agreement or Purchase Order resulting from a Solicitation is contingent upon the continued availability of appropriations and is subject to cancellation by the District, without penalty, either in whole or in part, if funds are not appropriated by Fort Bend ISD's Board of Trustees or otherwise not made available to the District.

1.4.2. The District's payment obligations are payable only and solely from funds appropriated and available for the purpose of the purchase.

1.4.3. The absence of appropriated or other lawfully available funds may render the Contract Award null and void to the extent funds are not appropriated or available and any Deliverables delivered but unpaid shall be returned to the Contractor.

1.4.4. The District shall provide the Contractor written notice of the failure of the District to make an adequate appropriation for any fiscal year to pay the amounts due under the Contract Award, or the reduction of any appropriation to an amount insufficient to permit the District to pay its obligations.

1.4.5. No penalty shall accrue to FBISD in the event this provision is exercised, and FBISD shall not be obligated or liable for any future payments due or for any damages as a result of termination under this section.

1.5. Confidentiality Subject to the Texas Public Information Act and any legal requirements, neither FBISD nor the Contractor shall disclose any confidential information without prior written approval. As applicable, Contractor shall maintain and process all information it receives from the District in compliance with all applicable data protection/privacy laws and regulations and FBISD policies. Contractor and FBISD understand that the Family Educational Rights and Privacy Act (FERPA), 20 U.S.C. § 1232g, governs the privacy and security of educational records and information and agree to abide by FERPA rules and regulations, as applicable. Contractor also acknowledges that FBISD is subject to the Texas Public

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Information Act, and Contractor waives any claim against and releases from liability FBISD, its officers, employees, agents, and attorneys with respect to disclosure of information provided under or in this Contract or otherwise created, assembled, maintained, or held by Contractor and determined by FBISD, the Attorney General of Texas, or a court of law to be subject to disclosure under the Texas Public Information Act.

1.6. Federal Funding The following shall be applicable to Solicitations that are funded by federal funds:

- 1.6.1. This section is applicable only for products or services to be paid with federal funds.
- 1.6.2. If federal funds will be used to pay for products or services, the Parties understand and agree the Agreement is subject to appropriation, approval, and disbursement of such funding by the United States federal government and its funding administrators, including, but not limited to, the Texas Education Agency. As applicable, the Parties agree to comply with any terms, conditions, and policies related to the use of federal funds, including, but not limited to, the Education Department General Administrative Regulations ("EDGAR") and any other requirements related to applying for, receiving, managing, and reporting federal funds. Contractor shall complete the required "EDGAR Certifications." Noncompliance or misrepresentation regarding this certification may be grounds for termination of an Agreement.
- 1.6.3. If FBISD does not receive sufficient funding, upon written notice to Contractor, FBISD may terminate an Agreement without penalty or further obligation to Contractor at the end of the period for which funding is available.
- 1.6.4. All contracts paid with federal grants shall be effective only during the period of availability of the funds identified in the Notice of Grant Award ("NOGA"). An Agreement is effective only after the NOGA is issued.
- 1.6.5. Federal Law (A-102) Common Rule and (A-110) OMB Circular prohibits non-federal entities, including school districts, from contracting with or making sub-awards under covered transactions to parties that are suspended or debarred or whose principals are suspended or debarred. Covered transactions include procurement Contracts for goods or services equal to or in excess of \$100,000 and all non-procurement transactions (e.g., sub-awards to sub-recipients). Contractors receiving individual awards for \$100,000 or more and all sub-recipients must certify that the organization and its principals are not suspended or debarred. By signature of the Solicitation, the Contractor affirms that neither it nor its principals are suspended or debarred by a federal agency.

1.7. Contract Kick-off Meeting

- 1.7.1. The District reserves the right to require the Contractor(s) to meet with District representatives prior to the start of the Contract.
- 1.7.2. The meeting, if any, shall include, at a minimum, discussion of the performance requirements, service specifications, expectations of professionalism, and access issues, if necessary.

1.8. Periodic Performance Reviews

- 1.8.1. The District reserves the right to require periodic performance reviews with the Contractor(s).
- 1.8.2. These reviews shall evaluate at a minimum, the Contractor's ability to:
 - 1.8.2.1. Provide goods or perform services within the required specifications and/or performance requirements;
 - 1.8.2.2. Meet the District's schedule; and
 - 1.8.2.3. Perform in a professional manner.

1.9. Usage Reports

- 1.9.1. The District will have the right to require the Contractor to provide usage reports of the goods or services purchased from the Contractor during the Contract Period. Usage reports will be computer generated format and made available in 5-7 business days after request.
- 1.9.2. This right may, at the District's option, be extended beyond the end of the Contract term for a maximum of two (2) years.
- 1.9.3. The reports shall be in a mutually agreed upon format that is useful by the District and made available by the Contractor.

1.10. Rights to Work(s) Made for Hire

- 1.10.1. All Work(s) Made for Hire, as that term is defined by the U.S. Copyright Law, shall be the sole property of the District. If commissioned by the District, paid or unpaid, to create a design, artwork, or custom-made product or service, the District shall be sole owner of any copyrights available for the end product.

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- 1.10.2. Contractor hereby assigns all its rights, title and interest in any and all Work(s) Made for Hire and all drafts thereof, including all worldwide copyright ownership rights in the Work(s) Made for Hire, to the District.
- 1.10.3. The Contractor shall turn over all relevant items relating to the Work Made for Hire, physical or electronic, to the District upon request. The District has the right to legible and complete copies of any and all such work papers upon the District's request.
- 1.11. Disclosure of Intellectual Property Produced**
 - 1.11.1. Contractor shall promptly disclose to the District all copyrights, trademarks, service marks, and/or patents ("Intellectual Property") which Contractor or Contractor's employees, Subcontractors, or Subcontractor's employees may produce, either solely or jointly with others, during the course of the services performed under the Contract.
 - 1.11.2. All such Intellectual Property shall automatically become the property of the District.
 - 1.11.3. In addition, Contractor shall promptly disclose to the District all Intellectual Property to which Contractor may acquire rights in connection with the performance of the services hereunder.
 - 1.11.4. Any disclosure under this paragraph shall contain sufficient technical detail to convey a clear understanding of the Intellectual Property, and shall identify any publication, sale, public use, or impending publication thereof.
 - 1.11.5. Promptly upon request, Contractor shall supply such additional information related to the Intellectual Property as the District may require.
 - 1.11.6. Modification and Derivative Works.
 - 1.11.6.1. The District shall have the right, in its sole discretion, to independently modify and/or create derivative works of any Intellectual Property incorporated in the services for the District's own purposes and use, through the services of its own employees or independent contractors.
 - 1.11.6.2. The District shall own all Intellectual Property Rights to such modifications and/or derivative works.
 - 1.11.6.3. Contractor shall comply with all laws and regulations relating to Intellectual Property. Contractor represents and warrants to the District that Contractor shall not infringe upon any Intellectual Property Rights of any third party. **CONTRACTOR SHALL INDEMNIFY AND HOLD FBISD HARMLESS FROM ALL CLAIMS, LIABILITIES, COSTS, SUITS OF LAW OR IN EQUITY, EXPENSES, ATTORNEYS' FEES, FINES, PENALTIES OR DAMAGES ARISING FROM CLAIMED INFRINGEMENT OF ANY INTELLECTUAL PROPERTY IN CONNECTION WITH THE CONTRACT.** Contractor's obligations under this clause shall survive acceptance and payment by FBISD.
 - 1.11.6.4. Contractor shall require its employees to execute any agreements, assignments, licenses or other instruments, and to provide information related to Intellectual Property, as may be necessary to effectuate the provisions of this Contract.
 - 1.11.6.5. Contractor shall require its Subcontractors and Suppliers to execute any agreements, assignments, licenses or other instruments, and to provide information related to Intellectual Property, as may be necessary to effectuate the provisions of this Contract.
- 1.12. Gratuities and Bribes**
 - 1.12.1. The District may, by written notice to the Contractor, cancel a Contract without liability to the District if it is determined by the District that gratuities or bribes were offered or given by the Contractor or any principle, agent or representative of the Contractor to any officer or employee of the District with a view toward securing the Contract or securing favorable treatment with respect to the awarding or amending or the making of any determinations with respect to the performing of such Contract.
 - 1.12.2. In the event the Contract is canceled by the District pursuant to this provision, the District 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.
- 1.13. Delays by the District** The District will have the right to delay a scheduled delivery or other service performance dates by written notice to the Contractor if the District deems such is in FBISD's best interest.

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1.15. *Delays by the Contractor*

- 1.15.1. If a Contractor foresees the delay of a scheduled delivery of a product or other service performance date, Contractor shall give timely written notice to the District.
- 1.15.2. The District may, at its sole discretion, extend the delivery or service date for valid reasons.
- 1.15.3. The Contractor must keep the District advised at all times of the status of the goods or services.
- 1.15.4. If the delay will create a burden on the District, the District reserves the right, without liability, in addition to its other rights and remedies, to terminate the Contract by notice effective when received, and to use any other means available to secure the goods or services outside the Contract, and receive reimbursement from Contractor for any loss incurred by the District as a result.

1.16. *Warranties and Remedies*

- 1.16.1. Status. The Contractor warrants that any services performed under the terms of the Contract by the Contractor or persons under its employment on FBISD property shall be done as an independent contractor and the persons doing such work shall not be considered employees, agents, joint venturers, or partners of the District. As an independent contractor, Contractor will be solely responsible for determining the means and methods for performing the services and shall furnish all tools, materials, transportation, and personal incidentals necessary in the performance of the services. Contractor shall be responsible for any and all applicable social security and personal income taxes which may become due as a result of any payments made by FBISD and Contractor shall indemnify and hold FBISD harmless in this regard. FBISD and Contractor have no power or authority to assume or create any obligation or responsibility on behalf of the other. Contractor agrees that FBISD has no responsibility for any conduct of any of Contractor's employees, agents, representatives, contractors, or Subcontractors. Contractor shall perform services in accordance with the highest standards of care, skill, diligence and professional competence applicable to contractors engaged in providing similar services.
- 1.16.2. Price
 - 1.16.2.1. The Contractor warrants the prices offered to the District are no higher than the Contractor's current prices on orders by others for like Deliverables under similar terms of purchase.
 - 1.16.2.2. The Contractor certifies that the prices in the Solicitation Response have been arrived at independently without consultation, communication, or agreement for the purpose of restricting competition, as to any matter relating to such fees with any other firm or with any competitor.
 - 1.16.2.3. In addition to any other remedy available, the District may deduct from any amounts due to the Contractor, and/or otherwise recover from Contractor, any amounts paid by the District for items or services in excess of the Contractor's current prices on orders by others for like Deliverables under similar terms of purchase.
- 1.16.3. Title
 - 1.16.3.1. The Contractor warrants that it has valid title to all Deliverables furnished under the Contract, and that the Deliverables are free and clear of all liens, claims, security interests and encumbrances.
 - 1.16.3.2. **THE CONTRACTOR SHALL INDEMNIFY AND HOLD THE DISTRICT HARMLESS FROM AND AGAINST ALL ADVERSE TITLE CLAIMS TO THE DELIVERABLES.**
- 1.16.4. Deliverables
 - 1.16.4.1. The Contractor warrants and represents that all Deliverables shall be free from defects in design, workmanship or manufacture, and conform in all material respects to the specifications, drawings, and descriptions in the Solicitation, to any samples furnished by the Contractor, to the terms, covenants and conditions of the Contract, and to all applicable State, Federal or local laws, rules, and regulations, and industry codes and standards. In addition, Contractor warrants that the Deliverables are suitable for and will perform in accordance with the purposes for which they are intended.
 - 1.16.4.2. Unless otherwise stated in the Solicitation, the Deliverables shall be new or recycled merchandise, and not used or reconditioned. Recycled Deliverables shall be clearly identified as such.
 - 1.16.4.3. Contractor shall assume all liabilities incurred within the scope or consequential damages

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and incidental expenses, as set forth in the Contractor or manufacturer's warranties, which result from either delivery or use by the District of the Deliverables with does not meet the specifications of the Contract or the Solicitation.

1.16.5. Warranty Period

1.16.5.1. Unless otherwise specified in the Contract, the warranty period shall be at least one (1) year from the District's acceptance of the Deliverable.

1.16.5.2. If the manufacturer's warranty is less than the required warranty period, the Contractor shall warrant the Deliverable to the full extent as provided by the manufacturer.

1.16.5.3. If during the warranty period, one or more of the above warranties are breached, the Contractor shall promptly, upon receipt of demand, resupply the goods or re-perform the services in accordance with the above standard at no additional cost to the District.

1.16.5.4. All costs incidental to such repair or replacement, including but not limited to, any packaging and shipping costs, shall be borne exclusively by the Contractor.

1.16.5.5. The District will endeavor to give the Contractor written notice of the breach of warranty within thirty (30) days of discovery of the breach of warranty, but failure to give timely notice shall not impair the District's rights under this section.

1.16.6. Failure to Repair or Replace If the Contractor is unable or unwilling to repair or replace defective or non-conforming Deliverables as required by the District, then in addition to any other available remedy, the District may reduce the quantity of Deliverables it may be required to purchase under the Contract from the Contractor, and purchase conforming Deliverables from other sources. In such event, the Contractor shall pay to the District, upon demand, the increased cost, if any, incurred by the District to procure such Deliverables from another source.

Damage Assessment

1.16.6.1. If a Contractor is in default on an order, the District reserves the right to purchase the goods or services in default and charge the increase in price, if any, and cost of handling to the Contractor (the "Damage Assessment").

1.16.6.2. Failure by Contractor to pay a Damage Assessment is cause for Contract termination, at District's sole discretion, and/or debarment of the Contractor from the District's Solicitation list for a minimum of one year.

1.16.7. Transfer of Manufacturer's Warranty

1.16.7.1. If the Contractor is not the manufacturer, and the Deliverables are covered by a separate manufacturer's warranty, the Contractor shall transfer and assign such manufacturer's warranty to the District.

1.16.7.2. If for any reason the manufacturer's warranty cannot be fully transferred to the District, the Contractor shall assist and cooperate with the District to the fullest extent to enforce such manufacturer's warranty for the benefit of the District.

1.16.8. Services The Contractor warrants and represents that all services to be provided the District under the Contract will be fully and timely performed in a good and workmanlike manner in accordance with generally accepted industry standards and practices, the terms, conditions, and covenants of the Contract, and all applicable Federal, State and local laws, rules or regulations.

1.16.9. Limitation of Warranty The Contractor shall not limit, exclude or disclaim the foregoing warranty(ies) or any warranty(ies) implied by law, and any attempt to do so shall be without force or effect.

1.16.10. Delivery of Goods or Performance of Services **If** the Contractor is unable or unwilling to deliver goods or perform services in accordance with the terms of the Contract, then in addition to any other available remedy, the District may reduce the amount of the Contract Award due to the Contractor, and purchase conforming goods or services from other sources. In such event, the Contractor shall pay to the District upon demand the increased cost, if any, incurred by the District to procure such goods or services from another source.

1.17. Indemnification

1.17.1. The District shall not be required to indemnify and/or hold harmless the Contractor and/or its agents and employees.

1.17.2. **TO THE FULLEST EXTENT PERMITTED BY LAW, THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE DISTRICT AND ITS AGENTS, EMPLOYEES, AND TRUSTEES FROM ANY AND ALL CLAIMS, DAMAGES, LOSSES, LIABILITIES, COSTS, SUITS IN LAW OR IN**

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EQUITY, FINES, PENALTIES, AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEY'S FEES, ARISING OUT OF OR RESULTING FROM THE PERFORMANCE OF THE WORK, AND/OR THE ACTS OR OMISSIONS OF CONTRACTOR OR ITS EMPLOYEES, AGENTS, SUBCONTRACTORS, AND/OR ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE, REGARDLESS OF WHETHER OR NOT IT IS CAUSED IN PART BY A PARTY INDEMNIFIED HEREUNDER, INCLUDING WITHOUT LIMITATION, THOSE ARISING FROM CLAIMED INFRINGEMENT OF ANY PATENT, TRADEMARKS, COPYRIGHT, OR OTHER CORRESPONDING RIGHT(S) RELATED TO ANY ITEM OR SERVICE CONTRACTOR IS REQUIRED TO PERFORM HEREUNDER. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this paragraph.

- 1.17.3. In any and all claims against the District or any of its agents or employees by any employee of the Contractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor under workers' compensation acts, disability benefits acts or other employee benefit acts.
- 1.18. **No Waiver of Immunity** Contractor acknowledges FBISD is a governmental entity subject to constitutional and statutory protections and immunities. No provision in any contract document shall be construed as a waiver or relinquishment of any governmental immunities or defenses on behalf of FBISD, its trustees, officers, employees, and agents as a result of an award or resulting agreement. Further, any obligation of the District to indemnify or hold harmless is expressly conditioned only to the extent permitted by law.
- 1.19. **Invoices and Payment** The Contractor shall submit separate invoices in duplicate on each Contract Award after each delivery of goods or completion of service. If the District authorizes partial shipments or deliveries it will be shown on the Purchase Order and a separate invoice must be sent for each shipment or delivery made.
 - 1.19.1. Payment to Contractor shall be made only after services are performed and not before. Advance payment to Contractor is strictly prohibited.
 - 1.19.2. Contractor shall submit detailed invoices to FBISD describing the Services rendered, the times when such Services were performed, compensable expenses and the amount due. Invoices shall indicate the FBISD Purchase Order number and shall be itemized and transportation charges, if any, shall be listed separately. A copy of the bill of lading and the freight waybill, when applicable, shall be attached to the invoice. Invoices shall be mailed to FBISD, P.O. Box 1004, Sugar Land, TX 77487-1004, Attention: Accounts Payables Department.
 - 1.19.3. Federal excise taxes, State taxes, or District sales taxes shall not be included in the invoiced amount. The District is not liable for these taxes. The District will furnish a tax exemption certificate upon request.
 - 1.19.4. In accordance with Texas Government Code § 2251.021, payments are due to Contractor within forty-five (45) days after the later of the following: (1) the date the District receives the goods; (2) the date the performance of the service is completed; or (3) the date the District receives an invoice for the goods or services.
 - 1.19.5. Payment terms, including the rate of interest that shall accrue on any overdue payments, are subject to Chapter 2251 of the Texas Government Code.
- 1.20. **Right to Assurance**
 - 1.20.1. Whenever one party to the Contract in good faith has reason to question the other party's intent to perform, demand may be made to the other party for written assurance of the intent to perform.
 - 1.20.2. In the event that no assurance is given within the time specified after demand is made, the demanding party may treat this failure as an anticipatory repudiation of the Contract.
- 1.21. **Advertising** The Contractor shall not advertise or publish, without the District's prior written consent, the fact that the District has entered into a Contract with Contractor. Contractor shall not use FBISD's name, logo or other likeness in any press release, marketing material or other announcement without FBISD's prior written approval.

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- 1.23. Compliance:** Contractor agrees to observe and abide by all applicable local ordinances and state and federal laws, including but not limited to, the Americans with Disabilities Act; Section 504 of the 1973 Rehabilitation Act; Executive Orders 11246 and 11375 regarding Equal Employment Opportunity, as supplemented in Department of Labor Regulations; the Family Educational Rights & Privacy Act; and Title IX of the Education Amendments of 1972. Contractor further agrees to observe and abide by all FBISD policies and procedures, which can be accessed online at <http://pol.tasb.org/Home/Index/483>.

2. CONTRACT AGREEMENTS

2.1. *Inclusions*

- 2.1.1. The Contract shall include these General Provisions, terms and conditions included in the contract, Contract Documents, Purchase Orders and Service Contracts, and supersede any other representations, agreements, arrangements, negotiations, or understanding, oral, or written between FBISD and the Contractor regarding the Contract.
- 2.1.2. The Solicitation Response, when appropriately accepted by FBISD, shall constitute an integral part of any Contract, equally binding between the Contractor and FBISD. Provided, however, that no different, inconsistent, contradictory, or additional terms included in Contractor's Solicitation Response will become part of this Contract with the exception of Change Orders.

2.2. *Interpretation*

- 2.2.1. The Contract Documents are intended by the Contractor and the District as a final, complete and exclusive statement of the terms of their agreement.
- 2.2.2. No prior arrangements, past performance, oral agreements or other factors between the Contractor and the District shall be relevant to supplement or explain any term used in the Contract Documents.
- 2.2.3. Although the Contract Documents may have been substantially drafted by one party, it is the intent of the Contractor and the District that all provisions be construed in a manner to be fair to both parties, reading no provisions more strictly against one party or the other.

2.3. *Jurisdiction and Venue*

- 2.3.1. The Contract is made under and shall be governed by the laws of the State of Texas, including, when applicable, the Uniform Commercial Code as adopted in Texas, V.T.C.A., Business and Commerce Code, Chapter 1, excluding any rule or principle that would refer to and apply the substantive law of another state or jurisdiction.
- 2.3.2. All issues arising from the Contract shall be resolved in the courts of Fort Bend County, Texas and the parties agree to submit to the exclusive jurisdiction of such courts.
- 2.3.3. The foregoing, however, shall not be construed or interpreted to limit or restrict the right or ability of the District to seek and secure injunctive relief from any competent authority as contemplated herein.

2.4. *Modifications*

- 2.4.1. The Contract Documents and their terms, covenants and conditions can be modified or amended only in writing, when executed by both parties.
- 2.4.2. No pre-printed or similar terms on any Contractor invoice, forms, order or other document shall have any force or effect to change the terms, covenants, and conditions of the Contract.

2.5. *Termination for Default*

- 2.5.1. In the event of a default by the Contractor, the District shall have the right to terminate the Contract in whole or in part for cause, by written Notice of Termination effective in ten (10) days, unless otherwise specified, after the date of such notice, unless the Contractor, within such ten (10) day period, cures such default, or provides evidence sufficient to prove to the FBISD Buyer's reasonable satisfaction that such default does not, in fact, exist.
- 2.5.2. In addition to any other remedy available under law or in equity, the District will be entitled to recover all actual damages, costs, losses and expenses, incurred by the District as a result of the Contractor's default, including, without limitation, cost of recovery, reasonable attorneys' fees, court costs, and prejudgment and post judgment interest at the maximum lawful rate.
- 2.5.3. Additionally, in the event of a default by the Contractor, the District may debar the Contractor from the District's Vendor list.
- 2.5.4. All rights and remedies under the Contract are cumulative and are not exclusive of any other right or remedy provided by law.

2.6. *No Cause Termination*

- 2.6.1. The District also reserves the right to terminate the Contract, with thirty (30) days' advance written notice to Vendor, if the District believes that, in its sole discretion, it is in the best interest of District

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to do so. It is understood that the District retains the option to terminate this Agreement for any reason at the end of each contract year without pecuniary risk or penalty. The termination will become effective, and this Agreement shall terminate following the written notification of intent.

- 2.6.2. The District will pay the Contractor, to the extent of funds appropriated or otherwise legally available for such purposes, for all goods delivered and services performed and obligations reasonably incurred by Contractor prior to the date of termination.

2.7. Assignment – Delegation

- 2.7.1. The Contract shall be binding upon and to the mutual benefit of the District and the Contractor and their respective successors and assigns, provided however, that no right or interest in the Contract shall be assigned, transferred, subcontracted, mortgaged, pledged, or otherwise disposed of or encumbered in any way by Contractor, and no obligation shall be delegated by the Contractor without the prior written consent of the District.
- 2.7.2. Any attempted assignment or delegation by the Contractor shall be void unless made in conformity with this paragraph.
- 2.7.3. The Contract is not intended to confer rights or benefits on any person, firm or entity not a party hereto; it being the intention of the parties that there are no third-party beneficiaries to the Contract.
- 2.7.4. If the Contractor has sold its business and the Contract is conveyed to another business entity (buyer) in the purchase, the Contractor shall, within three (3) business days of such change, provide the District with documentation that can be legally recognized in a State of Texas court of law, or a public announcement stating the terms of the purchase.

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2.9. Waiver

- 2.9.1. No claim or right can be discharged or waived in whole or in part by a waiver or renunciation of the claim or right unless the waiver or renunciation is supported by consideration and is in writing signed by the aggrieved party.
- 2.9.2. No waiver by either the Contractor or the District to require performance by the other party of the terms hereof shall operate as, or be construed to be, a permanent waiver of any rights or obligations under the Contract, or an express or implied waiver of any other term or breach thereof.

2.10. Captions

- 2.10.1. The captions herein are for convenience and identification purposes only, and are not an integral part hereof, and are not to be considered in the interpretation of any part hereof.

2.11. Force Majeure

- 2.11.1. Neither FBISD nor Contractor shall be deemed to have breached any provision of this Contract as a result of any delay, failure in performance, or interruption of service resulting directly or indirectly from acts of God, network failures, acts of civil or military authorities, civil disturbances, wars, energy crisis, fires, transportation contingencies, interruptions in third-party telecommunications or Internet equipment or service, other catastrophes, or any other occurrences which are reasonably beyond such party's control.
- 2.11.2. The parties to this Contract are required to use due caution and preventive measures to protect against the effects of force majeure, and the burden of proving that a force majeure event has occurred shall rest on the party seeking relief under this provision. The party seeking relief due to force majeure is required to promptly notify the other party in writing, citing the details of the force majeure event and relief sought, and shall resume performance immediately after the obstacles to performance caused by a force majeure event have been removed, provided the Contract has not been terminated. Delay or failure of performance, by either party to this Contract, caused solely by a force majeure event, shall be excused for the period of delay caused solely by the force majeure event. Neither party shall have any claim for damages against the other resulting from delays caused solely by force majeure. Notwithstanding any other provision of this Contract, in the event the Contractor's performance of its obligations under this Contract is delayed or stopped by a force majeure event, FBISD shall have the option to terminate the Contract. This section shall not be interpreted as to limit or otherwise modify any of FBISD's contractual, legal, or equitable rights.

2.12. FBISD Property

- 2.12.1. In the event of loss, damage, or destruction of any property owned by or loaned by FBISD that is caused by Contractor or Contractor's representative, agent, employee, or contractor, Contractor shall indemnify FBISD and pay to FBISD the full value of or the full cost of repair or replacement of such property, whichever is greater, within thirty (30) days of Contractor's receipt of written notice of FBISD's determination of the amount due. If Contractor fails to make timely payment, FBISD may obtain such money from Contractor by any means permitted by law, including, without limitation, offset or counterclaim against any money otherwise due to Contractor by FBISD.

2.13. Notice

- 2.13.1. Any notice provided under the terms of this Contract by either party to the other shall be in writing and shall be given by hand-delivery or by certified or registered mail, return receipt requested. Notice shall be deemed effective upon receipt. Each party may change the address at which notice may be sent to that party by giving notice of such change to the other party by certified or registered mail, return receipt requested.

2.14. Penalties

- 2.14.1. If Contractor is unable to provide the goods or services at the prices quoted in Contractor's Solicitation Response or if Contractor fails to fulfill or abide by the terms and conditions of the Contract, FBISD may take the following action(s), in FBISD's sole discretion, and Contractor agrees to comply with FBISD's action(s):
 - 2.14.1.1. insist that Contractor honor the quoted price(s) specified in Contractor's Solicitation Response;
 - 2.14.1.2. have Contractor pay FBISD difference between Contractor's price and the price of the next acceptable Solicitation Response (as determined by FBISD);
 - 2.14.1.3. have Contractor pay the difference between Contractor's price and the actual purchase

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price of the good or service on the open market; and/or

2.14.1.4. recommend to FBISD's Board of Trustees that Contractor no longer be given the opportunity to submit a proposal to FBISD and/or that the Contract be terminated.

2.15. Performance

2.15.1. Contractor agrees to use commercially reasonable best efforts to provide the Deliverable(s).

2.16. Performance and Payment Bonds

2.16.1. Contractor agrees to provide performance bonds and/or payment bonds as required by Texas law on specified Contracts and/or projects, as applicable. FBISD may include the performance and payment bonds requirement in the specifications section of any Solicitation if performance bonds and/or payment bonds are required.

2.17. Prevailing Wage Rates

2.17.1. Contractor and all subcontractors of Contractor shall comply with all laws regarding wage rates including, but not limited to, Texas Government Code Chapter 2258 and any related federal requirements applicable to the Contract.

2.18. Title and Risk of Loss

2.18.1. Whenever FBISD is purchasing an item under the Contract, title and risk of loss shall pass upon the later of FBISD's acceptance of the item or payment of the applicable invoice.

2.19. Severability In the event that any one or more of the provisions contained in the Contract shall for any reason be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provisions, and the Contract shall be construed as if such invalid, illegal, or unenforceable provision had never been contained in it.

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- 2.21. Dispute Resolution** Any claim, dispute, or matter in controversy arising out of or related to the award or agreement ("Dispute") shall be discussed by the parties in good faith, in an attempt to resolve the Dispute. In the event such Dispute cannot be resolved by good faith discussion between the parties, any such Dispute shall be subject to FBISD's complaint policy (GF Local or other policy designated by FBISD) and the timelines established in the policy. If a party is dissatisfied with the outcome of FBISD's complaint process, then the Dispute shall be subject to mediation as a condition precedent to litigation.
- 2.22. Contractor Representations** If Contractor is a business entity, it represents that: (i) it is duly organized, validly existing and in good standing under the laws of the state of its organization; (ii) it is authorized and in good standing to conduct business in the State of Texas; (iii) it has all necessary power and has received all necessary approvals to execute and perform its obligations in this Agreement; and (iv) the individual executing this Agreement on behalf of Contractor is authorized to do so.
- 2.23. Criminal History Certification** Contractor shall ensure that its employees who (i) have or will have continuing duties related to the contracted services, and (ii) have or will have direct contact with students (substantial opportunity for verbal or physical interaction with students that is not supervised by a certified educator or other professional District employee) have submitted all information necessary for FBISD's LEE Fast Pass process and will comply with any FBISD request for employee information in connection with completing such employee criminal history record search. If Contractor subsequently receives information an employee has a criminal history prohibited under this section, Contractor will immediately remove the employee from contract duties and notify the District in writing within 3 days. Contractor will comply with District objections to the assignment of an employee on the basis of the employee's criminal history. To the extent no individual or employee has or will have direct contact with students, Contractor will ensure the individuals or employees will not have direct contact with students throughout the term of this agreement. Noncompliance or misrepresentation regarding this certification is grounds for immediate termination of this Agreement.
- 2.24. Conflict of Interest Disclosure** Prior to and as a condition of doing business with the District, Contractor shall disclose any business relationship, past or present, with a sitting Board member or District employee. Any such relationship shall be disclosed on Form CIQ provided by the Texas Ethics Commission and currently available at <https://www.ethics.state.tx.us/forms/CIQ.pdf>. Failure to disclose the existence of any such relationship is grounds for immediate termination of this Agreement.
- 2.25. Disclosure of Interested Parties (Form 1295)** For any agreement that requires action by the District's Board of Trustees, unless excepted by Texas Government Code 2252.908(c), Contractor shall electronically submit a disclosure of interested parties on a form prescribed by the Texas Ethics Commission ("Form 1295") and submit a signed copy of the form with this Agreement. The form is currently available via the Texas Ethics Commission website at <https://www.ethics.state.tx.us/tec/1295-Info.htm>.
- 2.26. Felony Conviction Notice** Texas Education Code 44.034(a) requires "a person or business entity that enters into a contract with a school district [to] give advance notice to the district if the person or an owner 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." This notice is not required of a publicly-held corporation. If notice is required of Contractor, then Contractor shall submit a statement providing a person or an owner operator of the business entity has been convicted of a felony and a general description of the conviction and conduct resulting in the conviction of a felony.
- 2.27. Debarment or Suspension** Federal Law (2 CFR Part 180 and Part 200) prohibits non-federal entities from contracting with or making subawards under covered transactions to parties that are suspended or debarred or whose principals are suspended or debarred. Covered transactions include procurement contracts for goods or services equal to or in excess of \$25,000 and all nonprocurement transactions (e.g., subawards to subrecipients). Contractor certifies neither Contractor nor its principals are suspended or debarred by a federal agency.
- 2.28. Entities that Boycott Energy Companies:** In accordance with Senate Bill 13, Acts 2021, 87th Leg., R.S., pursuant to Section 2274.002 of the Texas Government Code (relating to prohibition on contracts with companies boycotting certain energy companies), Contractor represents and warrants that: it does not, and will not for the duration of the Contract, boycott energy companies. If circumstances relevant to this provision change during the course of the Contract, Contractor shall promptly notify the District.
- 2.29. Entities that Discriminate Against Firearm and Ammunition Industries:** In accordance with Senate Bill 19, Acts 2021, 87th Leg., R.S., pursuant to Section 2274.002 of the Texas Government Code (relating to

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prohibition on contracts with companies that discriminate against firearm and ammunition industries), Contractor verifies that: it does not, and will not for the duration of the Contract, have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association. If circumstances relevant to this provision change during the course of the Contract, Contractor shall promptly notify the District.

3. GOODS-RELATED CONTRACTS

3.1. *General*

- 3.1.1. Goods are to be delivered to the required destination(s) within the number of District Business Days as identified within the Solicitation after receipt of order (ARO).
- 3.1.2. All products shall be delivered F.O.B. destination, full freight allowed unless otherwise indicated within the Contract.
- 3.1.3. Ordering and direct delivery will involve various locations with FBISD unless otherwise specified within the Purchase Order.

3.2. *Hours for Delivery*

- 3.2.1. District Distribution Center (warehouse) delivery hours are 8:00 a.m. to 3:30 p.m.
- 3.2.2. School campus delivery hours are 9:00 a.m. to 3:00 p.m.

3.3. *Facilities.* With the exception of the District Distribution Center, no other facilities have areas available dock-level deliveries.

3.4. *Inside Delivery* The Contractor shall make inside deliveries within a facility to a location determined by the District if required within the Solicitation.

3.5. *Expedited Deliveries*

- 3.5.1. In case of an urgent need for an expedited delivery by the District, the Contractor is requested to supply the needed material immediately, if possible.
- 3.5.2. If the Contractor cannot respond, then the emergency requirement may be purchased on the open market. Such purchases shall not be considered a breach of Contract by FBISD or the Contractor.

3.6. *Packaging of Goods*

- 3.6.1. The Contractor shall package all goods in accordance with good commercial practice unless otherwise instructed.
- 3.6.2. Each shipping container shall be clearly and permanently marked as follows:
 - 3.6.2.1. The Contractor's name and address.
 - 3.6.2.2. The District's name, address and purchase order or purchase release number if applicable;
 - 3.6.2.3. Box number and total number of boxes, e.g. box 1 of 4 boxes; and
 - 3.6.2.4. The number of the container bearing the packing slip. The Contractor shall bear all cost of packaging.
- 3.6.3. All packing slips must include the FBISD Purchase Order number.
- 3.6.4. Goods shall be suitably packed to secure lowest transportation costs and to conform to requirements of common carriers and any applicable specifications. The District's count or weight shall be final and conclusive on shipments not accompanied by packing lists.

3.7. *Material Safety Data Sheets* A Contractor must provide, at no cost to the District, at least one copy of any applicable Manufacturer's Material Safety Data Sheet(s) (MSDS) with each shipment, and upon request, during the term of the Contract. If OSHA or Federal or State laws provide for additional requirements, those requirements shall be met by Contractor, in addition to the MSDS requirement.

3.8. *Inspection and Testing*

- 3.8.1. The District expressly reserves all rights under law, including but not limited to the Texas Business and Commerce Code, to inspect the Deliverables at delivery, and up to thirty (30) days after District's first use of the Deliverables, and to reject defective or non-conforming Deliverables.
- 3.8.2. All goods are subject to inspection and testing by FBISD for compliance with the Contract and/or Solicitation specifications by FBISD.
- 3.8.3. When products tested fail to meet or exceed all applicable specifications, the cost of the sample used and the cost of any testing shall be borne by the Contractor.
- 3.8.4. Goods, which have been delivered and rejected in whole or in part, may be, at FBISD's option, returned to the Contractor at Contractor's risk and expense or disposed of in accordance with FBISD's policies.
- 3.8.5. The Contractor may request that rejected goods be held by FBISD at Contractor's risk for a

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reasonable period of time for later disposition at the Contractor's expense.

3.8.6. Latent defects may result in revocation of acceptance of any product.

3.9. Substitutions of Goods

3.9.1. All substitutions of goods require prior written approval of the District.

3.9.2. The District reserves the right to require the Contractor to offer possible substitutes if any material or equipment becomes unobtainable during the term of the Contract.

3.9.3. Outstanding orders are not automatically amended by an approved substitution.

3.9.4. During the Contract term, Contractor may request a substitution of an item if the item is no longer manufactured or has been discontinued or superseded by a replacement model and is no longer available to the Contractor.

3.9.5. Substitution Approval Process. Under the forgoing or similar conditions, the Contractor may, in FBISD's sole discretion, be granted an allowance of an item substitution under the following conditions:

3.9.5.1. The Contractor provides the District Purchasing Office with written verification from the manufacturer that the product is no longer manufactured or has been discontinued or superseded by a replacement model and is no longer available to the Contractor.

3.9.5.2. All substitution requests must be submitted within ten (10) District Business Days after the material facts are known to Contractor.

3.9.5.3. If manufacturer has a substitution model, Contractor must provide product specifications along with a written letter requesting the item be substituted.

3.9.5.4. The substitution must meet or exceed all specification requirements associated with the original Solicitation.

3.9.5.5. If substitutions are made to an item that has accessories, the Contractor must also provide substitutions for accessories as applicable.

3.9.5.6. The Contractor will be expected to supply the substitute item at the same or better price than originally bid, unless the Solicitation provided a price increase provision and the substitute can meet the provision requirements.

3.9.5.7. Substitution will be in effect for the term of the Contract or until another substitution is required.

3.9.5.8. All substitutions must be approved in writing by the Purchasing Office prior to their effect.

3.9.5.9. The District reserves the right to approve and disapprove substitutions or to cancel the Contract or Purchase Order as it relates to the items in its entirety and procure the items by a separate procurement process.

3.10. Electrical Items All electrical items furnished shall meet all applicable OSHA standards and regulations and bear the appropriate listing from UL, FMRC or NEMA.

4. SERVICE-RELATED CONTRACTS

4.1. Contractor's Obligations. The Contractor shall fully and timely provide all Deliverables described in the Contract, Solicitation, and in the Vendor's Solicitation Response in strict accordance with the terms, covenants, and conditions of the Contract and all applicable Federal, State, and local laws, rules, and regulations.

4.2. Competence of Contractor

4.2.1. The Contractor warrants it shall have available the necessary personnel, organization, equipment, and facilities to perform all the services and/or provide all the goods required under a Purchase Order or this Contract.

4.2.2. Only qualified personnel adequately trained in the required services shall be employed by the Contractor.

4.2.3. The Contractor shall obtain all licenses/permits required for the performance of the services.

4.2.4. The Contractor shall employ only orderly and competent workers, skilled in the performance of the services which they will perform under the Contract.

4.2.5. The Contractor, its employees, Subcontractors, and Subcontractor's employees may not use or possess any firearms, alcoholic or other intoxicating beverages, tobacco, illegal drugs or controlled substances while on the job or on the District's property, nor may such workers be intoxicated, or under the influence of alcohol or drugs on the job.

4.2.6. The District reserves the right to prevent, forbid, and/or temporarily or permanently bar any of Contractor's employees, Subcontractors, or Subcontractor's employees from any District facility for whatever reason it determines necessary to maintain the safety, decorum, scheduling and day-to-

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day operations of the District.

4.3. *Licensing and Certification*

- 4.3.1. If the Contract requires licensing and/or certification to perform services as required, the Contractor shall provide only qualified licensed / certified individuals to perform such tasks.
- 4.3.2. The Contractor must maintain any required licenses / certification for the duration of the Contract.
- 4.3.3. The District reserves the right to require the Contractor to show proof of licensing / certification at any time during the Contract Term.

4.4. *Place and Condition of Work*

- 4.4.1. Services shall be provided/scheduled as specified or directed by the District.
- 4.4.2. The District shall provide the Contractor access to the sites where the Contractor is to provide the goods or perform the services as required.
- 4.4.3. The Contractor acknowledges that it has satisfied itself as to the nature of the District's service requirements and specifications, the location and essential characteristics of the work site(s) the quality and quantity of materials, equipment, labor and facilities necessary to provide the goods or perform the services, and any other condition or state of fact which could in any way affect performance of the Contractor's obligations under the Contract.
- 4.4.4. The Contractor releases and holds the District harmless from and against any liability or claim for damages of any kind or nature if the actual site or service conditions differ from expected conditions.

4.5. *Compliance with Laws and Safety Regulations*

- 4.5.1. The Contractor, its Subcontractors, and their respective employees, shall comply fully with all applicable federal, state, and local safety and health laws, ordinances, rules and regulations in the performance of the services, including but not limited to those imposed by the District and by the Occupational Safety and Health Administration (OSHA), as well as applicable workers' compensation laws, minimum and maximum salary and wage statutes and regulations, prompt payment and licensing laws and regulations.
- 4.5.2. In case of conflict, the most stringent safety requirements shall govern.
- 4.5.3. The Contractor shall indemnify and hold the District harmless from and against all claims, demands, suits, actions, judgments, fines, penalties and liability of every kind arising from the breach of the Contractor's obligations under this paragraph.

4.6. *Security and Background Investigations*

- 4.6.1. Prior to commencing any work under the Contract, if Contractor contracts with FBISD to provide services, Contractor must certify for each covered employee of Contractor who will have direct contact with students, Contractor has obtained, as required by Texas Education Code Section 22.0834: (a) state criminal history record information from a law enforcement or criminal justice agency or a private entity that is a consumer reporting agency governed by the Fair Credit Reporting Act (15 U.S.C. Section 1681 et seq.) for each covered employee of Contractor employed before January 1, 2008; and (b) national criminal history record information for each employee of Contractor employed on or after January 1, 2008. Contractor must also obtain similar certifications of compliance with Texas Education Code Chapter 22's requirements from any subcontractors on the form provided herein. Covered employees with disqualifying criminal history are prohibited from serving at FBISD; Contractor and any subcontracting entity may not permit a covered employee to provide services at a school if the employee has been convicted of a felony or misdemeanor offense that would prevent a person from being employed under Tex. Educ. Code § 22.085(a) (i.e., Title 5 felony or an offense requiring registration as a sex offender and victim was under 18 years of age or was enrolled in a public school at the time the offense occurred).
- 4.6.2. The Contractor shall be responsible for ensuring the District is protected from potential threats that may be created by their employees.
- 4.6.3. If directed by the laws of the State of Texas, the Contractor shall adhere to any requirements that may be legislated during the term of any Contract, or any enacted District policy.
- 4.6.4. The District will have the right to require Contractor's principles, Contractor's employees assigned to the Contract Award, Subcontractor's principles, and Subcontractor's employees assigned to the Contract, and any other individuals deemed to be providing goods or services for the District to be investigated (including fingerprinting) for criminal records and/or history.
- 4.6.5. The District reserves the right to prevent, forbid, and/or temporarily or permanently bar Contractor, Contractor's employees, Subcontractors, or Subcontractor's employees from any District facility for

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whatever security reason it determines necessary to maintain the safety of District employees and operations.

- 4.7. Subcontracts** Where a Subcontract may be used, the Contractor shall be fully responsible to the District for all acts and omissions of the Subcontracts just as the Contractor is responsible for the Contractor's own acts and omissions. Nothing in the Contract shall create for the benefit of any such Subcontract any Contractual relationship between the District and any such Subcontract, nor shall it create any obligation on the part of the District to pay or to see to the payment of any moneys due any such Subcontract except as may otherwise be required by law.
- 4.8. District Policy for Work Attire.** The Contractor, its employees, and Subcontractor employees shall not wear any T-shirts or clothing that has offensive language, pictures, or signs. The District prefers Contractors, its employees and subcontractors to wear uniforms with identification badges when on District premises.
- 4.9. Insurance for Services Performed**
- 4.9.1. ACORD Certificate of Insurance. Prior to providing services as a result of a Contract Award, the Contractor shall provide the District with a completed ACORD Certificate of Insurance providing the below listed coverage or such coverage as may be required in the Solicitation.

Type	Limit
Automobile Liability (Auto) - Covering 'Any Auto'	\$1,000,000 Combined Single Limit (\$5,000,000 if "For-Hire" motor carrier service)
Comprehensive General Liability (CGL) Including Products, Completed Operations, Independent Contractors, Broad Form Property Damage, Pollution and Blanket Contractual Liability coverages. XCU exclusions to be removed when underground work is performed.	\$1,000,000 Occurrence \$2,000,000 Aggregate \$1,000,000 Personal Injury \$ 500,000 Fire Damage \$ 5,000 Medical Payments
Professional Errors & Omissions Liability (E & O) may be required from all contractors and licensed or certified as professionals; e.g., engineers, architects, insurance agents, physicians, attorneys, banks, financial consultants, etc.	One-time project amount. \$1,000,000 Occurrence and Aggregate minimum \$5,000,000 Maximum Limit Retroactive Date preceding date of contract must be shown Extended Reporting Period three (3) years past completion
Workers' Compensation (WC) Limits to comply with the requirements of the Texas Workers' Compensation Act Employers Liability	Statutory Limits \$1,000,000
Umbrella or Excess Liability Excess of primary General Liability, Automobile Liability and WC Coverage B May be required for prime construction contractors May be required for non-construction contractors and licensed or certified as professionals; e.g., engineers, architects, insurance agents, physicians, attorneys, banks, financial consultants, etc.	 100% of Contract Amount for all contracts exceeding \$100,000, up to \$25,000,000 max \$5,000,000
Sex Molestation/Abuse Required when service performance permits direct, unsupervised access to students.	\$100,000 per claim/\$300,000 aggregate

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Cyber/Data Liability

Required if service involves use of or access to District-owned data. Coverage for Notification, Crisis Management, Regulatory Response and Privacy Liability.

Limit determined on per project basis.

4.9.2. Insurance Conditions All certificates must include:

- 1) The location or description and the bid number, CSP number or Purchase Order number
- 2) A 30 day notice of cancellation of any non-renewal, cancellation or material change to any of the policies
- 3) Additional Insured on the Property, General Liability, Automobile Liability and Umbrella (Excess) Liability policies naming the District.
- 4) A "Waiver of Subrogation" clause in favor of the District will be attached to the Workers Compensation, General Liability, Automobile Liability, Umbrella Liability and the Property insurance policies.
- 5) In addition to certificates of insurance, copies of policy endorsements must be provided (a) listing the District as Additional Insured, and (b) showing waivers of subrogation in favor of the District: CG2010, CG2037, CG2404, CA0070, CA0032, WC0003 or their equivalents.
- 6) Contractor shall not commence work until all required insurance coverages have been obtained and such insurance has been reviewed and accepted by the District. Certificates of Insurance on the current ACORD form shall be issued to the District showing all required insurance coverages.
- 7) All insurance coverages shall be issued on an Occurrence basis (except Professional Liability) by companies acceptable to District and licensed to do business in the State of Texas by the Texas Department of Insurance. Such companies shall have a Best's Key rating of at least "A- X".
- 8) The District reserves the right to review the insurance requirements during the effective period of any contract to make reasonable adjustments to insurance coverages and limits when deemed reasonably prudent by District based upon changes in statutory laws, court decisions or potential increase in exposure to loss.
- 9) Limits for primary policies may differ from those shown when Umbrella or Excess Liability insurance is provided.
- 10) Contractor shall be responsible for payment of all deductibles.
- 11) At any time during the Contract Term or any extensions thereof, prior to any lapse in the Certificate of Insurance, the Contractor shall provide to the District an updated certificate.

4.10. Right to Audit The District will have the right to audit the Contractor's books and records pertaining to all goods and services, and Contractor's compliance with the terms of the Contract, during the hours of the normal workday during the term of the Contract and for a period of five (5) years following expiration of the Contract.

Exhibit A

FORT BEND I.S.D. CONSTRUCTION BOND & INSURANCE REQUIREMENTS

It is suggested that this Exhibit be provided to the Contractor's insurance provider.

Contractor shall not commence work until all required bonds and insurance coverages have been obtained and such insurance has been reviewed and accepted by the District. Certificates of Insurance on the current ACORD form shall be issued to the District showing all required insurance coverages.

Bonds Required

Construction, installation and service contracts (including repair and alteration) exceeding \$100,000 requires that a 100% Performance Bond be furnished by the successful bidder (contractor). Contracts exceeding \$25,000 require that a 100% Payment Bond be furnished by the successful bidder (contractor). All such bids must include a 5% Bid Bond.

Bonds shall be issued by a company authorized to do business in the State of Texas with an A.M. Best Company rating of at least A- X and included on the U.S. Department of the Treasury Listing of Approved Sureties (Dept. Circular 570). The contractor shall be responsible for obtaining bonds and shall absorb any and all costs of such Bonds.

<u>Insurance Required</u>	<u>Limit Required</u>
Automobile Liability insurance covering Any Auto	\$1,000,000 Combined Single Limit
Comprehensive (Commercial) General Liability insurance including Products, Completed Operations, Independent Contractors, Broad Form Property Damage, Pollution and Blanket Contractual Liability coverages. XCU exclusions to be removed when underground work is performed.	\$1,000,000 Occurrence \$2,000,000 Aggregate \$1,000,000 Personal Injury \$ 500,000 Fire Damage \$ 5,000 Medical Payments Per Project Aggregate (CG 70 49) Evidence of coverage must be shown on certificates of insurance.
Professional Errors & Omissions Liability insurance may be required from all contractors and licensed or certified as professionals; e.g., engineer architects, insurance agents, physicians, attorneys, banks, financial consultants, etc.	One time project amount; \$1,000,000 Occurrence & Aggregate minimum, \$5,000,000 Maximum Limit Retroactive Date preceding date of contract must be shown Extended Reporting Period three years past completion of contract
Workers Compensation insurance with limits to comply with the requirements of the Texas Worker Compensation Act Employers Liability insurance	Statutory Limits \$1,000,000
Umbrella or Excess Liability insurance (excess of primary General Liability, Automobile Liability and WC Coverage B) Applicable to minimum contract amounts of \$100,000	100% of Contract Amount up to a maximum of \$25,000,000. For construction contracts in excess of \$25,000,000 higher limits may be required.

Limits for primary policies may differ from those shown when Umbrella or Excess Liability insurance is provided.

All Risk Builders Risk Property Insurance shall be required for all construction contracts when property of the owner is at risk or in the care, custody and control of the Contractor. Builders Risk insurance shall be required for all construction contracts requiring a bond. All Property insurance shall include coverage against the perils of Flood and Earthquake. (Installation Floater may be substituted when contract involves installation only.)	Contract Limit or Replacement Cost Value of Scope of Work whichever is greater Permission to Occupy granted Deductible: 1% of contract, \$50,000 maximum, unless otherwise approved by the Owner.

Insurance Conditions

All insurance coverages shall be issued on an Occurrence basis (except Professional Liability) by companies acceptable to District and licensed to do business in the State of Texas by the Texas Department of Insurance. Such companies shall have a Best's Key rating of at least "A- X".

All certificates must include:

1. The location or description and the bid number, CSP number or Purchase Order number
2. A 30 day notice of cancellation of any non-renewal, cancellation or material change to any of the policies
3. "Additional Insured" on the Property, General Liability, Automobile Liability and Umbrella (Excess) Liability policies naming the District.
4. A "Waiver of Subrogation" clause in favor of the District will be attached to the Workers Compensation, General Liability, Automobile Liability, Umbrella Liability and the Property insurance policies.
5. In addition to certificates of insurance, copies of policy endorsements must be provided (a) listing the District as Additional Insured, and (b) showing waivers of subrogation in favor of the District: CG2010, CG2037, CG2404, CA0070, CA0032, WC0003 or their equivalents.

All insurance must be maintained for one year following substantial completion with Certificates of Insurance provided.

Contractor shall be responsible for payment of all deductibles; the District shall approve the deductibles selected.

If any policy has aggregate limits, a statement of claims against the aggregate limits is required.

The District reserves the right to review the insurance requirements during the effective period of any contract to make reasonable adjustments to insurance coverages and limits when deemed reasonably prudent by District based upon changes in statutory laws, court decisions or potential increase in exposure to loss.

FORT BEND Independent School District
C/o Director – Design & Construction Department
2323 Texas Parkway
Missouri City, TX 77489



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

THE OWNER:

(Name, legal status and address)

Fort Bend Independent School District
16431 Lexington Boulevard
Sugar Land, Texas 77479

THE ARCHITECT:

(Name, legal status and address)

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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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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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User Notes:

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents 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), Performance Bond, Labor and Material Payment Bond, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement 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, the Contract Documents do not include the advertisement or invitation to propose, instructions to Proposers, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's Proposal or portions of Addenda relating to proposal requirements).

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. 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 Modification. 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, (3) 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.

§ 1.1.3 The Work

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. It also includes all 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 and all other items of cost or value needed to produce, construct and fully complete the public work identified by the Contract Documents. Nothing in these Conditions shall be interpreted as imposing on either the Owner or the Architect, or their respective agents, employees, officers, directors or consultants, any duty, obligation or authority with respect to any items that are not intended to be incorporated into the completed Project, or that do not comprise the Work, including, without limitation, shoring, scaffolding, hoists, weatherproofing, or any temporary facility or activity, since these are the sole responsibility of the Contractor.

§ 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 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 of Service

Instruments of Service are 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. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

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.

§ 1.2 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.

§ 1.2.1.2 Precedence of the Contract Documents: The most recently issued Document takes precedence over previous issues of the same Document. The order of precedence is as follows with the highest authority listed as "1".

- .1 Contract Modifications (such as Change Orders) signed by the Contractor and Owner.
- .2 The Agreement. (AIA Document A101-2017)
- .
- .3 The General Conditions of the Contract for Construction
- .4 Addenda, with those of later date having precedence over those of earlier date
- .5 Drawings and Specifications

Should these Documents disagree in themselves, the Architect and Owner will select the appropriate method for performing the Work, to facilitating avoiding increase in the Contract cost. If an item is shown one place in the Drawings, but no 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.

§ 1.2.1.3 Relation of Specifications and Drawings: To be equivalent in authority and priority. Should they disagree in themselves, or with each other, prices shall be based on the most expensive combination of quality and quantity of Work indicated. In the event of the above mentioned disagreements, the resolution shall be determined by the Architect and Owner.

§ 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.

§ 1.2.4 In the case of inconsistency within or between the Drawings and Specifications discovered prior to Proposal Submission Time but too late to be clarified by an Addendum, the better quality or greater quantity of Work shall be included in the Proposal. Clarification of any inconsistency will be accomplished with the Contractor after award of Contract and, if necessary, an appropriate reduction in the Contract will be accomplished by Change Order.

§ 1.2.5 Product 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 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 Relations of Specifications and Drawings. 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, 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 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. 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 the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 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 Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service 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.

§ 1.6 Notice

§ 1.6.1 Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer at the corporation for which it was intended, or if delivered at or sent by certified mail, or 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 delivered by facsimile or other electronic communications to the offices of the person or corporation for which it was intended. For facsimiles or other electronic communications received after 5:00 p.m. on a business day, or on a weekend or legal holiday on which the recipient's offices are closed, notice shall be deemed to have been duly served on the next business day.

(Paragraph deleted)

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission 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 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.

§1.9 Miscellaneous Other Definitions

§1.9.1 Addenda, Addendum. Documents issued by the Architect prior to execution of the Owner Contractor Agreement for this Project that modify or clarify the Proposal Documents. All addenda become a part of the Contract Documents.

§1.9.2 Alternate Proposal(s). A separate amount stated on a separate Proposal Form which, if accepted by the Owner, will be added to or deducted from the Base Proposal. If accepted, the work that corresponds to the alternate proposal will become part of the agreement between Owner and Contractor. Alternate proposals shall remain valid for the same period of time as the Base Proposal after receipt of proposals, regardless if an Owner Contractor Agreement has been executed, unless indicated otherwise herein.

§1.9.3 Approved, Approved Equivalent, Approved Equal, or Equal. The terms Approved, Approved Equivalent, Approved Equal, and Or Equal, relate to the substitution of products or systems approved in writing by the Architect. Refer to Paragraph 3.4.2, Substitution of Products and Systems, for procedures which must be followed after award of contract. The substitution procedure process to be followed prior to receipt of proposals is described in the Instructions to Bidders.

§1.9.4 Base Proposal. The Contractor's proposal for the Work, not including any Alternates.

§1.9.5 Contract Time. The period of time which is established in the Contract Documents for Substantial Completion of the Work. This period of time is subject to authorized adjustments as enumerated in the Contract Documents.

§1.9.6 Date of Agreement. The date the Owner formally awards a Contract for Construction of the Work. This date will be inserted in the first page of the Agreement between Owner and Contractor and shall be referenced in Performance Bond and Payment Bond forms. See also Date of Commencement of Work.

§1.9.7 Date of Commencement of the Work. The date of a written Notice to Proceed to the Contractor for a given portion of the Work. This date constitutes day zero (0) of the stated Contract Time. The Notice to Proceed will be issued after the District has received and validated the Contractor's Payment Bond, Performance Bond and Insurance.

§1.9.8 Date of Final Completion. The end of construction. See AIA Document A201, Section 9.10.

§1.9.9 Day. The following days are referenced in the documents:

- .1 **Calendar Days:** The Contract Time is established in Calendar Days and extensions of time granted for Regular Work Days lost, if any, will be converted to Calendar Days.
- .2 **Holidays:** The days officially recognized by the construction industry in this area as a holiday; normally limited to the observance days of New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and the day after and Christmas Day.
- .3 **Regular Work Days:** All calendar days except holidays, Saturdays, and Sundays. Requests for extensions of time shall be requested on the basis of Regular Work Days, and those days, if approved, will be converted to calendar days by multiplying by a factor of one and four-tenths (1.4).
- .4 **No extensions of the Contract Time will be granted due to inclement weather except as stated in Section 8.3.1.**

§ 1.9.10 Final Completion. Achieved after the Work has been completed by the Contractor, the final inspection has been performed by the Architect and the Owner, the Contract Closeout process has been completed, and the final Certificate for Payment has been issued by the Architect to the Owner. See Sections 1.1.14 and 9.10 and Specification sections regarding Contract Close Out.

§1.9.11 Notice to Proceed. A notice that may be given by the Owner to the Contractor that directs the Contractor to start the Work. It may also establish the Date of Commencement of the Work.

§ 1.9.12 The Project Manual. A volume assembled for the Work which may include the Proposal requirements, sample forms, Conditions of the Contract, Drawings and Specifications.

§ 1.9.13 Proposal. A complete and properly signed proposal to do the Work for the sums stipulated therein, submitted

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on the prescribed forms in accordance with the Proposal Documents.

§ 1.9.14 Proposal Documents. All documents and bound into or referenced in the Project Manual, the Drawings, and Addenda related thereto. The Project Manual contains the Proposal requirements, Contract and other forms, Conditions of the Contract, the Specifications, and a list of Drawings and Schedules, some of which are bound into the Project Manual (other Drawings and Specifications are bound separately).

§ 1.9.15 Proposer. A person or entity who submits a Proposal.

§ 1.9.16 Provide. Whenever the word "provide" is used in these documents, it shall mean the same as "furnish and install".

§ 1.9.17 Punch List. A comprehensive list prepared by the Contractor prior to Substantial Completion to establish all items to be completed or corrected; this list may be supplemented by the Architect or Owner. See AIA Document A201, Section 9.8.

§ 1.9.18 SMALL BUSINESS ENTERPRISE PROGRAM ("SBEP"). Owner has adopted the SBEP to provide increased business opportunities for locally certified small businesses to competitively participate in contracting and procurement within FBISD. See FBISD Board Policy CV(Local).

§ 1.9.19 SUB-PROPOSER. A person or entity who submits a Proposal to a Proposer for materials, equipment or labor for a portion of the Work.

§ 1.9.20 Unit Prices. A cost for a unit of work as described in the Contract Documents. The Owner may add or deduct Unit Price work at the amounts stated on the Proposal Form and such amounts shall not be subject to additional mark up by the Contractor or his subcontractors."

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. All parties understand that only the Board of Trustees for the Owner acting as a body corporate has the authority to bind the Owner with respect to all matters requiring the Board's approval under current policy of the Board of Trustees for the Owner, including, but not limited to, Change Orders. Except as otherwise provided in Section 4.2.1, the Architect does not have authority to bind the Owner with respect to matters requiring the Owner's approval or authorization. The term "Owner" means the Owner or the Owner's authorized representative.

(Paragraph deleted)

§ 2.1.2 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, to approve a Change Order requiring an increase in the Contract Sum, or agree to an extension to the contractual Completion Date, unless this authority is lawfully delegated. Neither Architect nor Contractor may reply upon the direction of any employee of Owner or Program Manager who has not been designated in writing by the Superintendent of Schools or Board of Trustees of Owner; Owner shall not be financially responsible for actions taken by the Architect or Contractor in reliance upon direction from unauthorized persons.

§ 2.1.3 The presence of the Owner, Program Manager or Architect at the Work site does not imply acceptance or approval of the Work.

§ 2.1.4 The Owner, being a public body under the laws of the State of Texas, must have funds in the full amount of the Contract on hand prior to award and execution of the Contract. Furthermore, no Contract exists between the Owner and the Contractor until the formation of the Contract is approved by a majority of the Board of Trustees of the Owner in open session at a duly held Board meeting, and the contract is signed by an authorized Owner's representative.

§ 2.1.5 At any time prior to the Owner's receipt of the executed Agreement with the required bonds and insurance, the Owner may, at its sole option and without cause, reject the offer described in this Agreement 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, shall cause

no obligation or duty to the Owner save return of bid or proposal security, if any, if rejection is without cause. This section does not pertain to rejection for cause by the Owner, or for the Contractor's failure to provide required bonds or insurance.

§ 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, 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.

(Paragraphs deleted)

§ 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 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 in the Agreement 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.

§ 2.3.4 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.

§ 2.3.5 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.

§ 2.3.6 The Contractor shall pay the cost of reproduction, postage, and handling of all sets of Drawings and Specifications necessary for the Contractor to execute the Work. If the Contractor requests in writing that the Architect and his Consultants update the original Drawings and Specifications to incorporate Addendum items, or Modifications, the Architect and his Consultants will do so at their expense. However, the Contractor shall pay the cost of reproduction, postage and handling of all sets of Drawings and Specifications necessary for the Contractor to execute the Work.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract 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.

§ 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, 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 deficiencies. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the actual cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect, Program Manager and other consultants' additional services and expenses made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to the prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner within thirty (30) days of receipt of written notice from the Owner therefor.

§ 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

§ 2.7 Owner's Right to Occupy the Project

§ 2.7.1 The Owner shall have the right to occupy or use without prejudice to the right of either party, any completed or largely completed portions of the project, notwithstanding the time for completing the entire work or such portions may not yet have expired. Such occupancy and use shall not constitute acceptance of any work not in accordance with the Contract Documents. If the Contractor determines that said occupancy may cause a delay to the completion of the project, he shall notify the Owner in writing immediately.

§ 2.7.2 Refer to Article 11 Insurance and Bonds regarding property insurance requirements in the event of such occupancy.

§ 2.7.3 If Contractor has not completed the obligations of the Contract Documents by the dates established by subsequent Amendments to the Agreement Between Owner and Construction Manager, the Owner shall have the right to occupy or use the entire project.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement 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.

§ 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, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 The Contractor must be fully qualified under any state or local licensing laws for Contractors in effect at the time and at the location of the work. The Contractor is responsible for determining that all of his subcontractors and prospective subcontractors are duly licensed in accordance with the law.

§ 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.

§ 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 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.

§ 3.2.3 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.

§ 3.2.4 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, 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, 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. If 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 provided such errors, inconsistencies, omissions, differences, or nonconformities could not have been ascertained from a careful study of the Contract Documents.

§ 3.2.5 The Contractor shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation or initiating a Request for Information (RFI). The Contractor shall not ask the Architect for observation of work prior to the Contractor's field superintendent's personal inspection of the work and his determination that the work complies with the Contract Documents. The Contractor shall arrange meetings for the Architect, prior to commencement of the Work, with all major subcontractors, to allow the subcontractor to demonstrate his understanding of the documents to the Architect and to allow the subcontractor to ask for any interpretation he may require. 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.

§ 3.2.6 If, in the opinion of the Architect and the Program Manager, the Contractor does not make a reasonable effort to comply with the above requirements of the Contract Documents and this causes the Architect or his Consultants to expend an unreasonable amount of time in the discharge of the duties imposed on him by the Contract Documents, then the Contractor shall bear the cost of compensation for the Architect's additional services made necessary by such failure. The Architect will give the Contractor prior notice of intent to bill for additional services related to Sections 3.2.5, 3.2.6 and 3.7 before additional services are performed.

§ 3.2.7 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, he shall promptly notify the Architect in writing, providing substantiation for his position. Any necessary changes, including substitutions of materials, shall be accomplished by appropriate Modification. If the Contractor fails to perform the obligations of Section 3.2.1 and 3.2.2, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations.

§ 3.2.8 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 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 construction work, and shall be responsible for any loss,

damage, or extra expense resulting from such damage. The Contractor and each Subcontractor shall evaluate and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including

- .1 the location, condition, layout 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.

§ 3.2.9 Contractor shall be responsible for any damage done to such lines, cables, pipes and pipelines during its construction work resulting from its negligent conduct

§ 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 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 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 not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures, but only to the extent the Owner would be responsible for any such losses or damages under state and/or federal law.

§ 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 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 Contractors' 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 any controlled substance, carrying weapons, speaking profane and/or offensive language, or engaging in any inappropriate interactions of any nature whatsoever with students, and teachers, staff and visitors, including talking, touching, staring or otherwise contributing to a hostile or offensive environment for Owner's students and staff. 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. 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 termination of the employment of the offending employee from all construction on any of Owner's property and immediate removal from the site.

§ 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.

§ 3.3.4 The Contractor is especially cautioned to coordinate the routing of mechanical and electrical items prior to commencing these operations.

§ 3.3.5 Contractor shall bear sole responsibilities for design and execution of acceptable trenching and shoring

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procedures, in accordance with Texas Government Code, Section 2166.303 and Texas Health and Safety Code, Subchapter C, Sections 756.021, et seq. On trench excavations in excess of 5 feet in depth, Contractor shall pay a qualified engineer, experienced in the engineering design and preparation of drawings and specifications for compliance with state requirements for trenching and shoring, to prepare and professionally seal detailed drawings and specifications directing Contractor in the safe execution of trenching and shoring.

§ 3.3.6 Any time that the Contractors' 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 are on site, the work shall be supervised by a qualified employee of the Contractor.

§ 3.3.7 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 obligation 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 Section 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 Occupational Safety and Health Administration

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, 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.

§ 3.4.2 The materials, products, and the systems covered by these specifications have been selected as a standard because of quality, particular suitability, or record of satisfactory performance. It is not intended to preclude the use of equivalent or better materials, products, or systems provided that same meets the requirements of the particular project and have been approved in an addendum as a substitution prior to the submission of bids. If prior written approval in an addendum has not been obtained, it will be assumed that the Bid is based upon the materials, products, and systems described in the Bidding Documents and no substitutions will be permitted, except as provided hereinafter.

- .1** If, after award of contract, the Contractor or one of his Subcontractors, or Suppliers determines 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 the Warranty, the Contractor shall promptly notify the Architect, in writing, providing detailed substantiation for his position. Any changes deemed necessary by the Owner and Architect, including substitution of materials and change in Contract Sum, either upward or downward, if any, shall be accompanied by appropriate Modification.
- .2** After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products on the Work in place of those specified only under the conditions set forth in specification referring to Product Options and Substitutions.
- .3** Requests for substitution, received by the Architect later than forty five (45) days after "Notice to Proceed" or "Date of Commencement of the Work" (whichever occurs first), may result in additional costs to the Owner. Contractor agrees to reimburse the Owner through deductive Change Order to the Contract, for all costs associated with such requests.
- .4** By making request for substitutions based on Subparagraph 3.4.2 above, the Contractor
 - .1** represents that the Contractor has personally investigated the proposed substitute product and determined that it is equivalent or superior in all respects to that specified, and is suitable for the intended purpose;
 - .2** represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
 - .3** certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
 - .4** will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
- .5** Substitution requests shall be submitted on the forms included herein and in accordance with the

process established in specification referring to Product Options and Substitutions.

§ 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.

- .1 State law prohibits possession and/or use of alcohol and tobacco products on school property at all times.
- .2 State law prohibits weapons or firearms on school property.
- .3 There shall be zero tolerance for fraternization with students, teachers and any other school district personnel, Contractor will immediately remove any employee that violates this provision from the project.
- .4 No glass bottles shall be brought on the construction site or Owner's property by any construction personnel.
- .5 Background checks

Contractor must give advance notice to the Owner 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 Owner may terminate this Agreement pursuant to Article 14 Termination if the Owner determines that the person or business entity failed to give notice as required by this section or misrepresented the conduct resulting in the conviction. This section requiring advance notice does not apply to a publicly held corporation. 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 OR CONTRACTOR'S FORCES' NON-COMPLIANCE WITH CRIMINAL LAW.

§ 3.4.4 The Contractor shall disclose the existence and extent of any financial interests, whether director indirect, such Contractor may have in any Subcontractor or material supplier which the Contractor may propose for this Project.

§ 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 Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect cause by abuse, material alteration to the Work not executed by the Contractor, insufficient maintenance or maintenance not in compliance with written instructions therefor, operation not in compliance with written instructions therefor, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. The warranties set out in this section are not exclusive of any other warranties or guarantees set out in other places in the Contract Documents 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.

§ 3.5.3 In the event of failure in the Work, including a specified product, whether during construction, or the correction period (which shall be one (1) year from the Date of Substantial Completion, except where a longer period as specified), the Contractor shall take prompt and appropriate measures to assure correction or replacement of the defective Work or any portion thereof, including manufactured products, whether notified by the Owner or the Architect. Upon correction of warranty items, the Contractor shall provide the Owner and Architect with written notification of said correction. This obligation shall survive acceptance of the Work under the Construction Contract.

§ 3.5.4 The Contractual Correction Period for this Project is one (1) year from the date of Substantial Completion, except for any extended warranties as specified within the Contract Documents. Items of Work not completed until after the deadline for Substantial Completions shall have their warranties (general and any extended warranty periods) extended by the period of time between the deadline for Substantial Completion and the actual completion of the Work. Such warranties shall be submitted to the Owner in writing, documenting such time extensions. This correction period shall not restrict or modify extended warranties called for or provided on systems, equipment or other specific portions of the Work.

§ 3.5.5 The Contractor shall accompany the Owner and Architect for a complete reinspection of the Project approximately eleven (11) months after the Date of Substantial Completion and shall promptly complete any observed or reported deficiencies in the Work, including any uncompleted Punch List items or outstanding and incomplete warranty items. The contractor shall provide written notification to the Owner and Architect when said Punch List items and/or additional deficiencies observed have been corrected. This obligation shall survive acceptance of the Work under the Construction Contract.

§ 3.5.6 Contractor shall certify that the Project has been constructed in conformance with the Architect's or Engineer's plan, specifications, and Contract 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 Section 61.1036(c) (3) (F). The Contractor shall deliver to the Owner its written guarantee, in the form attached to this contract as Exhibit "F", guaranteeing all of the work under the contract to be free from faulty materials in every particular, and free from improper workmanship, and against injury except from proper and usual wear and tear; and agreeing to replace or re-execute without cost to the Owner such work as may be found to be improper, imperfect or of unsatisfactory material and/or workmanship, without cost to the Owner, and to make good all damage caused to other work or materials, or to the Owner's property, real and personal, due to such improper, imperfect or faulty material and/or workmanship, and/or due to the required replacement or re-execution. Such warranty periods shall be maintained notwithstanding that certain systems may be activated prior to Substantial Completion as required for the satisfactory completion of the project. This guarantee shall be made to cover a period of one (1) year from the date of Substantial Completion as certified by the Architect under this Contract. This guarantee must be furnished to the Owner and approved by it before acceptance and final payment is made.

Upon written notice from the Owner, the Contractor shall promptly remedy defects as covered by his guarantee. If Contractor does not respond to Owner's written notice, either by beginning corrective work or notifying the Owner in writing stating when work will begin, within ten (10) days of receipt, the Owner may take measures to correct the work himself and Contractor will be obligated to reimburse Owner's costs. If notice of defects covered by warranty is given in writing to the Contractor on a timely basis, the obligation to provide the warranty work may extend beyond the one year warranty period until the warranty defect is remedied and accepted by the Owner. The Contractor shall provide bond coverage to extend for the one (1) year period of the guarantee to insure performance under the terms of his obligation. The provisions of this section shall be in addition to, and not in lieu of, any other rights and remedies available to the Owner.

§ 3.5.6.1 All required warranties on equipment, machinery, materials, or components shall be submitted to the Architect and Program Manager on the manufacturer's or supplier's approved forms at the time of Substantial Completion.

§ 3.5.6.2 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 standard, 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 standard, or
- .3 such further reasonable proof as is required by the Architect.

§ 3.5.7 The warranties of Contractor provided in Sections 3.5.2 and 3.5.3 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 of 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.

§ 3.5.8 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 or final completion. Contractor shall maintain a complete and accurate schedule of the dates 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. 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

§ 3.6 Taxes

The Owner qualifies for exemption from State and Local Sales and Use Taxes pursuant to the provision of Article 20.04(f) of the Texas Limited Sales, Excise and Use Tax Act. Taxes normally levied on the purchase, rental and lease of materials, supplies and equipment used or consumed in performance of the Contract may be exempted by issuing to suppliers an exemption certificate in lieu of tax. Exemption certificates comply with State Comptroller of Public Accounts Ruling No. 95-0.07. Any such exemption certificate issued in lieu of tax shall be subject to State Comptroller of Public Accounts Ruling No. 95-0.09, as amended. Failure by the Contractor or Subcontractors to take advantage of the Owner's exemption and to obtain such exemption certificate shall make him responsible for paying taxes incurred on materials furnished on the Project without additional cost to or reimbursement by the Owner.

§ 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.

.1 The Owner shall pay directly to the governing authority the cost of all permanent property utility assessments and similar utility connection charges.

.2 The Contractor shall pay directly all temporary utility charges (excluding permanent power), utility district/company inspection fees, temporary tap charges, and temporary water meter charges and any other similar fees assessed by jurisdictional authority having control over this Project. The Contractor shall secure and pay for all governing authorities' permit fees.

.3 Fees payable to the Texas Department of Licensing and Regulation (TDLR) for document review relative to the Elimination of Architectural Barriers Act shall be paid by the Owner and the Architect will submit the documents to the TDLR for review and approval.

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.5 The Contractor shall include in his base Proposal the permit fee required by Harris County. The Owner will be responsible for fees payable to the TDLR, any MUD and the Third-party plan reviewer.

§ 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.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, 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 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 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for,

performance of any part of the Work, 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. 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 comply with the provisions of Section 22.0834 of the Texas Education Code and Section 153.1117 of the Texas Administrative Code. The form of certification by the Contractor shall be supplied by the Owner, and must be supplemented by the Contractor as required by law, or as requested by the Owner.

§ 3.7.7 The Contractor shall be responsible for timely notification to and coordination with all utility companies regarding the provision of or revising of services to the Project. The Contractor shall inform the Architect and Program Manager at once when the Owner's participation is required. 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, payment for permanent utility services shall be the responsibility of the Contractor until Substantial Completion.

§ 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 and approve in writing. All unused allowance amounts shall be credited back to Owner. No markup shall be allowed for the Contractor on any expenditures from Allowances or Contingency funds included in the Contract Sum.

§ 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, 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 shall be adjusted accordingly by Change Order. The amount of the 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.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent, project manager and necessary assistants who shall be in attendance at the Project site during performance of the Work, including Punch List work. The superintendent and project manager shall represent the Contractor, and unless provided otherwise in Section 3.1.1, communications given to the superintendent or project manager shall be binding as if given to the Contractor.

§ 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 shall 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. In the event a substitution of superintendent is necessary, the Contractor shall reimburse the Owner, Architect and his Consultants (on a reasonable hourly basis) for additional costs incurred due to said substitution. No increase in Contract Time or Contract Sum shall be allowed in the event the Owner or Architect objects to any nominated superintendent. The superintendent must be at the construction site acting in his supervisory capacity at all times when construction is in progress. A separate full-time superintendent will be required for each school site.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 Within 30 days of being awarded an Amendment, the Contractor shall prepare and submit for the Owner and Architect's review, a construction schedule for the Work, with critical path clearly defined. The schedule shall not exceed time limits current under the Contract Documents. For further schedule requirements refer to specification section regarding project schedules in the Project Manual.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall 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 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. Requirements for the submittal schedule are outlined in specification section 01 32 16, Construction Progress Schedules. 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 the Contract Sum or extension of the 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 submit to the Architect, with each monthly Application for Payment; a copy of the progress schedule updated to reflect the current status of the project. All schedule updates shall address the subject of how the Contractor intends to address any critical path delays previously encountered. The schedule and all updates should address submittal activities as well as actual field construction activities. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The Contractor's schedule shall be prepared in a format which at a minimum graphically portrays (1) the beginning and duration for each phase of the Work described in those specification sections included in the Project Manual, (2) a critical path, meaning a limited sequence of critical activities, which establishes a linked sequence of each critical activity, a delay to any of which will cause a delay in completion of the Work, and (3) the float, indicating an activity or sequence which does not necessarily have to start or end on the scheduled date(s) to maintain the 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 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 the 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 General Conditions as progress reports) as set forth in Section 3.10.1 or if requested by either the Owner or the Architect. The Contractor shall take whatever action necessary to assure that the project completion schedule is met.

§ 3.10.5 The Contractor's schedule may be considered when requested extensions of time are evaluated. 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 schedule 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. When it appears to Owner or Contractor that a Contract milestone or completion date cannot be met, Contractor will develop with the Owner, Program Manager and Architect a plan and a budget.

§ 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 Section 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Section 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, and 2) such rescheduling is required for the convenience of the Owner and is no attributable to any act or omission of Contractor.

§ 3.11 Documents and Samples at the Site

§ 3.11.1 The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, 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, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.11.2 In addition to any other requirement in the Contract Documents and prior to installation, Contractor is to furnish or cause subcontractor to furnish, for the Owner 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.

§ 3.11.1 The Contractor shall post all Addenda on Construction Documents prior to commencing work in the site.

§ 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.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. 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.

- .1** Submittals shall be submitted at the earliest possible time in order to expedite delivery of critical or long lead time items. For more complex systems and equipment (such as structural steel; doors, windows and hardware; casework; mechanical, electrical, and plumbing systems and equipment; food service equipment; sound systems and the like), the Contractor shall schedule at least 30 days for the Architect or the Architect's Consultants' review and submittals shall be sequenced logically in accordance with the schedule, required fabrication and installation time.
- .2** Where colors are to be selected by the Architect, the Contractor shall submit all product color samples in adequate time to allow the Architect to prepare a complete selection schedule. In general, all submittals requiring color selection shall be submitted to the Architect within four

weeks of the date of the Contract for Construction. Regarding critical delivery items, wherever feasible, the Architect will release color selections on critical materials as they are needed.

§ 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.

.1 If, in the opinion of the Architect, the Shop Drawings, Product Data, Samples and similar submittals are incomplete, indicate an inadequate understanding of the work covered by the submittals, or indicate a lack of study and review by the Contractor prior to submittal to the Architect, the submittals will be returned, unchecked, to the Contractor for correction of these three deficiencies and subsequent resubmittal. Additional service charges as outlined in 3.2.6 may be charged by the Architect in this event.

.2 The Architect will take no action on Shop Drawings, Product Data, and Samples that have not first been certified, by stamped, signed notation, as having been checked and approved by the Contractor for use in the Work, or that are not specifically required by the Contract Documents. **§ 3.12.6** By 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.

(Paragraph deleted)

§ 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 accepted 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 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 acceptance 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 notice, the Architect's acceptance of a resubmission shall not apply to such revisions.

§ 3.12.9.1 Deviation from the requirements of the Contract Documents indicated on shop Drawings, Product Data, and Samples, does not constitute the required notification "in writing.

§ 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 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.

§ 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 Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents to the Architect at least thirty (30) days prior to the date the Contractor needs the reviewed submittals returned. Where colors are to be selected by the Architect, submit all Samples in adequate time to allow the Architect to prepare a complete selection schedule. In general, all submittals requiring color selection shall be submitted to the Architect within four weeks of the date of the contract for construction.

§ 3.12.12 The Contractor shall submit digital PDF's of Shop Drawings, Product Data, and similar submittals in the proper format according to the procedures stipulated within the Contract Documents. Digitally submitted Shop Drawings will be reviewed and marked by the Architect and/or his consultants and returned to the Contractor for his use, distribution, correction or resubmittal as required. Contractor corrections or revisions shall be resubmitted to the Architect in accordance with same procedures. The digitally marked up prints will be retained by the Architect and his consultants. Samples shall be submitted directly to the Architect for review.

§ 3.12.13 The Contractor shall provide MEP coordination drawings within a schedule mutually agreed upon by the Team and prior to installing the Work, showing how all piping, ductwork, lights, conduit, equipment, etc. will fit into the ceiling space allotted, including clearances required by the manufacturer, by code, or in keeping with good construction practice. Space for all trade elements must be considered on the same drawing. Drawings shall be at 1/4 inch per foot minimum scale and shall include invert elevations and sections required to meeting intended purpose. The Contractor may propose an alternate method of accomplishing MEP coordination. If the alternate method is approved by the Team, it may be utilized.

§ 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 promptly 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 any entity for which the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner.

§ 3.13.4 Contractor shall ensure that the Work, at all times, is performed in a manner that affords the Owner reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas 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 Contract Documents, Contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of: 1) any area and buildings adjacent to the site or the Work or 2) 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. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended from time to time

§ 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. 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 Leave all chases, holes and openings, straight and true, of proper size, and cut them into existing work as may be necessary for the proper installation of the work. Consult with all Subcontractors concerned, regarding proper locations and size. In case of conflict between requirement for cutting and patching and any other requirement of the Work, submit request for direction before proceeding with the Work. In case of failure to leave or cut them in the proper place, openings shall be cut afterward at no expense to the Owner. No excessive cutting will be permitted, nor shall any piers or other structural members be cut without prior approval. After such work has been installed, satisfactorily and carefully fit around, close up, repair, patch, and point up all cuts. Work shall be done with proper tools by workmen of the particular trade to which work belongs and shall be done without extra expense to the Owner. No description of specific cutting, patching, digging, etc., required for the work under a Specification Section that may be required for the proper accommodation of that work to the work of other trades shall relieve the Contractor from responsibility described above.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. 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.

§ 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 the Contractor.

§ 3.15.3 Prior to the Architect's inspection for Substantial Completion the Contractor shall clean exterior and interior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces; clean equipment and fixtures to a sanitary condition; replace air filters in mechanical equipment; clean roof, 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; and make the Work ready in all respects for immediate and full use by the Owner.

§ 3.15.4 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor or deducted from the final payment to Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Program Manager, their designated representative, and Architect with access to the Work in preparation and progress wherever located.

§ 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 hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for 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. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY DEFEND AND HOLD HARMLESS THE OWNER AND ITS TRUSTEES, OFFICERS, AGENTS, AND EMPLOYEES (COLLECTIVELY, THE "INDEMNIFIED PARTIES") FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE OR DEATH OF ANY EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR ITS SUBCONTRACTORS OF EVERY TIER, EVEN IF THE BODILY INJURY, SICKNESS, DISEASE OR DEATH IS CAUSED BY OR ALLEGED TO HAVE BEEN CAUSED BY THE NEGLIGENCE, FAULT OR STRICT LIABILITY OF ANY OF THE INDEMNIFIED PARTIES.

FOR ALL CLAIMS NOT ADDRESSED IN THE ABOVE PARAGRAPH, CONTRACTOR SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS THE OWNER AND ITS TRUSTEES, OFFICERS, AGENTS, AND EMPLOYEES AND (COLLECTIVELY, THE "INDEMNIFIED PARTIES"), FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, OF ANY NATURE WHATSOEVER ARISING OUT OF OR RELATED TO THIS AGREEMENT OR THE WORK TO BE PERFORMED UNDER THIS AGREEMENT, BUT ONLY TO THE EXTENT OF THE NEGLIGENCE OR OTHER FAULT OF THE CONTRACTOR, ITS AGENTS, REPRESENTATIVES, EMPLOYEES OR SUBCONTRACTORS OF ANY TIER.

§ 3.18.2 It is understood and agreed that Subparagraph 3.18 above is subject to, and expressly limited by, the terms and conditions of TEX. CIV. PRACT. & REM. CODE ANN. 130.001-130.005 (Vernon Supp. 1989), as amended or modified, or any successor statute. Contractor shall **not** be obligated under Subparagraph 3.18 to indemnify or hold harmless Program Manager, Architect or any agent, servant of employee of Architect from liability or damage that is caused by or results from:

- .1** defects in plans, designs or specifications prepared, approved or used by the Architect; or
- .2** negligence of the Architect in the rendition or conduct of professional duties called for or arising out of the Contract Documents and the plans, designs or specifications that are a part of the Contract Documents; and arises from:
 - .1** personal injury or death;
 - .2** property injury; or
 - .3** any other expense that arises from personal injury, death or property injury.

§ 3.18.3 It is agreed with respect to any legal limitations, now or hereafter in effect and affecting the validity or enforceability of the indemnification obligation 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 obligation shall continue in full force and effect.

§ 3.19 Record Drawings

§ 3.19.1 Refer Owner's Closeout Procedures

§ 3.20 Prevailing Wage Rates

§ 3.20.1 As required by Chapter 2258 of the Texas Government Code Title 10 Prevailing Wage Rate, no employee used in this construction may be paid less than the minimum prevailing wage rate in effect for the Owner.

§ 3.20.2 The Contractor and each Subcontractor and Sub-subcontractor shall pay to all laborers, workmen, and mechanics employed in execution of this Contract not less than rates set forth by law for each craft of type of workman or mechanic needed to execute this Contract.

§ 3.20.3 Determination of prevailing wages shall not be construed to prohibit payment of more than the rates

identified.

§ 3.21 Antitrust Violations

§ 3.21.1 Contractor hereby assigns to Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1 et.seq. (1973). The Contractor shall include this provision in his contracts with each Subcontractor and Supplier. Each Subcontractor shall include such provision in contracts with Sub-subcontractors and suppliers.

§ 3.22 Third-Party Beneficiary

§ 3.22.1 No person or entity shall be deemed to be a third-party beneficiary of any provision(s) of this Contract; nor shall any provision(s) hereof be interpreted to create a right of action or otherwise permit anyone not a signatory party to the Contract to maintain an action for personal injury or property damage.

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.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 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 Contract Documents by the responsibilities, activities or duties 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 representative 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 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..

§ 4.2.2 The Architect, as a representative of the Owner, will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the work, and (3) to determine in general if the work is being performed in a manner indicating that the work, when fully completed, will be in accordance with the Contract documents. The Architect will be required to make on-site inspections as necessary to keep the Owner informed of the progress of the Work and as necessary to guard the Owner against defects and deficiencies in the Work. The Architect will neither have control over or charge of, no be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1. Further:

- .1** The Contractor expressly recognizes that the Architect does not owe him any duty to supervise or direct his work as to protect the Contractor from the consequences of his own acts or omissions.
- .2** Upon reasonable request by the Owner, the Contractor shall accompany the Owner and Architect on an observation tour(s) of the building and shall note any defects and start remedying these defects within ten (10) days of the observation tour. Contractor shall prosecute the Work without interruption until accepted by the Owner and the Architect.
- .3** Section 4.2.2, and the provisions of the Architect's Agreement with the Owner shall govern the number of site visits by the Architect. In this case, the Owner and Architect may agree in writing on an alternative site visit schedule that is appropriate for this particular project.
- .4** If during the Architect's site visits the Architect observes any deviation from requirements of the Contract Documents, the Architect (or designee) shall report within three (3) business days to the Owner any such deviation. A copy of said report shall be sent to the

Contractor. Failure to observe or report any deviation shall not be a waiver to subsequently require correction of the same, similar or other deviations.

§ 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 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.

§ 4.2.4 Communications

The Owner and Contractor shall 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 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 shall have authority to reject Work that does not conform to the Contract Documents. The Architect shall be required to promptly notify the Owner of any non-conforming Work and shall reject such non-conforming Work unless the Owner objects to the rejection in writing within twenty-four (24) hours of such notification. Whenever the Architect considers it necessary or advisable for implementation of the intent of the Contract documents, the Architect will have authority to require inspection or testing of the Work in accordance with the provisions of the Contract Documents, whether or not such Work is fabricated, installed or completed. Performance of any additional inspection or testing, which would result in additional cost to the Owner, shall require advance notice to and approval of the Owner. 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 to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work, except when the Contractor's inability to perform the Work is a result of design flaw, error or omission.

§ 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 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 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 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 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.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.8.1 Allowance Expenditure will be authorized using Allowance Expenditure authorizations (AEA) executed by the Owner, the Architect and the Contractor. All Allowance Expenditure Authorizations will be incorporated into the contract by Change Order at the completion of the project. Work authorized by an AEA may be invoiced as it is completed.

§ 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; 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 issue a final Certificate for Payment pursuant to Section 9.10.

§ 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.

§ 4.2.11 The Architect will interpret and decide matters 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.

§ 4.2.12 Interpretations and decisions 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, 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 All decisions on matters relating to aesthetic effect shall initially be made by the Architect; however, all such decisions are subject to the Owner's written approval.

§ 4.2.14 The Architect will review and respond to requests for information about 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.

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. Wherever relevant, the term "Subcontractor" shall also include a person, or entity who supplies material or equipment for the Project.

§ 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 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 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 may notify 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 Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner 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 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. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall 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 substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution. Prior to such change the Contractor shall notify the Architect of his intent and reasons for such proposed change. § 5.2.5 The Contractor shall submit the list of proposed Subcontractors on AIA Document G805. The Contractor may obtain blank copies from the Architect.

§ 5.2.6 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. 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, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. 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.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a 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 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract, but only to the extent permitted by law.

§ 5.4.2 Upon such assignment, 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.

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 other 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 may perform other Work with separate Contractors or forces. 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.

(Paragraphs deleted)

§ 6.1.3 The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the other 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's and Owner's separate contractor's work, including required monitoring, testing and inspections by independent firms, with the Work under this Agreement. 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 contain 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.

§ 6.2 Mutual Responsibility

§ 6.2.1 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.

§ 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 the Architect 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. Failure of the Contractor to notify the Architect 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 to receive the Contractor's Work. The Contractor shall not be responsible for 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.

§ 6.2.4 The Contractor shall promptly remedy damage 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.

§ 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 Architect will allocate the cost among those responsible.

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 or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.1.1 No change 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.

§ 7.1.1.2 Contingency Allowance Expenditure Authorization. A change in the work that does not require a change in Contract Sum or Contract Time may be paid from a designated Project Allowance. A Contingency Allowance Expenditure Authorization (CAEA) is a written order prepared by the Architect and signed by the Architect, Owner, Contractor and Program Manager directing a change in the Work.

§ 7.1.2 A Change Order shall be based on agreement among the Owner's Board of Trustees, Contractor, and Architect, except when the Contract balance is amended as a result of Owner's Right to Carry out the Work under Section 2.4. or the Owner's assessment of liquidated damages as allowed by the Contract Documents. In such event, the Change Order is deemed approved by Contractor, and Contractor's signature(s) are not required. A Construction Change Directive requires agreement by the Owner, or the Owner's representative, and Architect, and may or may not be agreed to by the Contractor; an order for a minor change may be issued by the Architect alone.

§ 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 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.

§ 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; 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 shall be determined in one or more of the ways listed below. The first method listed shall be used unless the Architect determines that the method is inappropriate, in which case another method shall be selected:

- .1 By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation. Where additional Work is involved, any lump sum over the amount of \$10,000.00 shall be broken down to represent the estimated cost of labor and materials plus mark-ups to cover overhead and profit.
 - .1 To compensate the Contractor, Subcontractor, or Sub-subcontractor actually performing a part of the Work for the combined cost of overhead and profit, the performing party shall be entitled to a single mark-up not to exceed 10% of the estimated cost of that part of the Work.
 - .2 To compensate (a) the Contractor for the combined cost of overhead and profit on Work performed by Subcontractors, or (b) Subcontractors for the combined cost of overhead and profit on Work performed by Sub-subcontractors, the Contractor or Subcontractor shall be entitled to a single mark-up not to exceed 5% of the subcontract amount.
 - .3 When a Sub-subcontractor performs the Work of a change, the maximum mark-up not to exceed 10% for combined overhead and profit shall be used only by the Sub-subcontractor. The Contractor and Subcontractor would each be entitled to a single mark-up not to exceed 5% of the cost to them for the Subcontractor and Sub-subcontractor, respectively.
- .2 By Unit Prices stated in the Contract Documents or subsequently agreed upon. Additional mark-ups for overhead and profit will not be allowed in Unit Price work.
- .3 By cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee.

- .4 Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.2.2 shall be limited to the costs established in Sections 7.3.7.1 through 7.3.7.5.

§ 7.2.3 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.

§ 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 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 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

(Paragraph deleted)

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the methods described in Section 7.2.2 or as provided in Section 7.3.4.

(Paragraph deleted)

§ 7.3.4 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, directly related to the change and required by Contract Documents (unless the change is charged to an allowance already included in the Contract Sum, in which case additional mark-ups for these items will not be allowed; 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 Contract Time.

§ 7.3.7 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.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. 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 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

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. 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 Contract Time, 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 the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

§ 7.5 Allowable Markups for Changes in the Work

§ 7.5.1 Unless otherwise directed, the procedure and markup of the costs for additional work shall be determined in the following manner:

- .1** Upon Change Proposal request, the Contractor shall quote the cost for changes in the work showing separately, credits and additional costs broken down by headings used in the Schedule of Values. Further breakdown into units of labor and materials may be required if agreement on cost cannot be reached using the breakdown by headings. The final cost shall be the amount of the Total Contract Value Change shown on the Change Proposal signed by the Contractor and Owner. For general construction work, not subcontracted, the Contractor shall consider as costs the actual invoice amount for additional materials, the sales tax on additional materials when applicable, the wages paid for additional direct labor, plus the Contractor's usual markup of wages to cover additional labor related costs such as insurance, taxes and fringe benefits.
- .2** On changes executed within the Owner's Contingency Allowance, Contractor shall have included costs for combined overhead and profit, to the extent permitted by the Contract Documents, and General Conditions costs, including the cost of superintendents, field office expense, temporary facilities and services, small hand tools, construction equipment not specifically provided for the change in hand, home office expense, bond and building insurance premiums, and managing the Subcontractor's work, in his Base Contract amount. Allowed overhead and profit fee on Owner's Contingency Allowance changes to be included in the total cost to the Owner shall be based as follows:
 - .1** For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, ten percent (10%) of the cost.
 - .2** For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractors.

§ 7.5.2 If any additional Work is authorized outside of or in excess of the Owner's Contingency Allowance, the combined overhead and profit for this work shall be based as follows:

- .1** For the Contractor, for Work performed by the Contractor's own forces, a maximum total markup of ten percent (10%) of the actual cost on a lump sum project, or the Contractor's Construction Phase Fee on a Guaranteed Maximum Price Project.
- .2** For Work performed by the Contractor's Subcontractor(s), five percent (5%) of the amount due the Subcontractor(s).
- .3** For each Subcontractor or Sub-subcontractor involved, for work performed by that Subcontractor's or Sub-subcontractor's own forces, a maximum markup of ten percent (10%) of the actual cost.

.4 For each Subcontractor, for work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7.

§ 7.5.3 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 and detailed 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. In no case will a change be approved without such itemization.

§ 7.5.4 Change orders, as they are accepted by the Owner, shall be entered under heading "Change Orders" in the next current Request for Payment.

§ 7.5.5 All credits to or deductions from the Contract Sum, a Contingency or an Allowance shall be calculated using the same methodology set forth in this Section 7.5. All unused Contingency or Allowance amounts shall be credited back to Owner prior to final payment, along with any markups included in the Contract Sum or GMP on such unused amounts.

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 Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined. See further definition of "Day" in Section 1.9.10. § 8.2 Progress and Completion

(Paragraph deleted)

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other unforeseeable causes beyond the Contractor's control, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine. **No extensions of the Contract Time will be granted for inclement weather, except for Force Majeure events consisting of named storms or government declared emergencies resulting from extreme weather.**

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

§ 8.3.4 The parties hereto agree that time is of the essence of this Contract and that pecuniary damages would be suffered by the Owner if the Contractor does not substantially complete all Work called for in the

Contract Document by the specified date, which damages are, by their very nature, difficult of ascertainment. It is therefore expressly agreed, as a part of the consideration inducing the Owner to execute this Contract that the Owner may deduct from the final payment made to the Contractor a sum equal to the amount stated in the Contract Documents, per phase for each and every Calendar Day beyond the agreed date which the contractor has agreed to for Substantial Completion of the Work included in the Contract Documents. It is expressly understood that 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 substantially completed within the agreed time, or with the legally 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 or forfeiture; said damage being caused by additional compensation to personnel, and other miscellaneous increased costs, all of which are difficult of exact ascertainment. The liquidated damages assessed herein shall be Owner's sole remedy for time delays between the deadline for substantial completion and Contractor's achievement of substantial completion.

§ 8.3.5 Failure to complete and close-out the Project, and complete all Punch List items, within sixty (60) days after the scheduled Substantial completion date will additionally entitle the Owner to deduct from the final payment made to the Contractor a sum equal to the amount stated in the Contract Documents, per phase, for each and every Calendar Day beyond the 60-day close-out period. It is expressly understood that 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 Project close-out does not occur on a timely basis. Said sum shall be considered as liquidated damages only and in no sense shall be considered a penalty or forfeiture; said damage being caused by additional compensation to personnel, and other miscellaneous increased costs, all of which are difficult of exact ascertainment. If the Contractor is delayed through no fault of the Owner, the Substantial Completion is not achieved by the agreed contract completion date, the Project close-out period of sixty (60) days will not be extended by the number of days of delay past the actual Substantial completion date and will remain based upon the agreed contract completion date.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.1.1 The Owner is exempt from payment of Texas State Sales Tax on materials required for the Work. Therefore, to comply with the law, the Contract Sum shall be broken down into the amount of cost for labor and the amount of cost for materials. This breakdown shall be provided by the Contractor within ten (10) days of award of Contract.

§ 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 shall be equitably adjusted.

§ 9.2 Schedule of Values

§ 9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect and Program Manager a schedule of values fairly allocating the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as reasonably required by the Architect and Program Manager, and updated for changes in the Work, the schedule of values shall be used only as a basis for reviewing the Contractor's Applications for Payment and is not to be taken as evidence of market or other value. The schedule shall not overvalue early job activities. Each item shall include a pro-rata portion of overhead and profit. The schedule shall follow the divisions of the Specifications so far as practicable and shall contain line items for equipment and system start up and testing.

§ 9.2.1 General Contractor's cost for Contractor's fee, bonds and insurance, General Conditions, etc., shall be listed as individual line items.

§ 9.2.2 Schedule of Values shall break each line into materials and labor. Once approved by the Owner and Architect, it shall be used as basis for reviewing Application for Payment but not be taken as evidence of market or other value.

§ 9.2.3 Contractor's cost for various construction items shall be detailed. For example, concrete work shall be subdivided into footings, grade beams, floor slabs, paving, etc. These subdivisions shall appear as individual line items.

§ 9.2.4 On major subcontracts, such as mechanical, electrical, and plumbing, the Schedule shall indicated line items and amounts in detail, (for example; underground, major equipment, fixtures, installation of fixtures, start up, etc.)

§ 9.2.5 Costs for subcontract work shall be listed without any addition of General Contractor's costs for overhead, profit or supervision.

§ 9.2.6 The Contractor shall include a value for the coordination documents/drawings on the schedule of values.

§ 9.2.7 The Contractor shall include a value for the correction of deficiencies noted by the Commissioning Agent and the Test, Adjust and Balance consultant on the schedule of values for each sub-contractor subject to commissioning and test, adjust and balance requirements.

§ 9.3 Applications for Payment

§ 9.3.1 No later than 3 working days prior to the first Wednesday of each month, submit an itemized Application for Payment, supported by such data sustaining the Contractor's right to payment as the Owner or Architect may require, and reflecting retainage, as provided elsewhere in the Construction Documents. Information on the form shall be divided into the same last day of the month preceding, which shall also be the basis of payment or as agreed by the Owner, Contractor and Architect by verification at the site, prior to submittal.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives but not yet included in Change Orders.

§ 9.3.1.2 Contractor agrees, for purposes of Texas Government Code 2251.042, receipt of the Certified Applications for Payment from the Architect shall not be construed as receipt of an invoice by the Owner. Contractor further agrees that Program Manager's receipt of the Certificate of Payment shall be construed as receipt of an invoice by the Owner, for purposes of Texas Government Code Section 2251.042

§ 9.3.2 Payments will be made on account of materials or equipment 1) incorporated in the Work; 2) suitably stored at the site; or 3) suitably stored at some off-site location, provided the following conditions are met for off-site storage:

- .1 The location must be agreed to, in writing, by the Owner and Surety.
- .2 The location must be a bonded warehouse.
- .3 Surety must agree, in writing, to each request for payment.
- .4 The Contractor must bear the cost of the Owner's and Architect's expenses related to visiting the offsite storage area for confirmation.

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 procedures satisfactory to the Owner to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance (naming the Owner as insured) and transportation to the site for those materials and equipment stored off the site. Under no circumstances will the Owner reimburse the Contractor for down payments, deposits, or other advance payments for materials or equipment.

The Contractor acknowledges that the review of materials and/or equipment stored off the side is an additional service of the Architect, and the Contractor shall be charged for that service. The cost for such service will be established by the Architect and is not subject to appeal.

§ 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.

§ 9.3.4 The Contractor shall submit requests for payment in duplicate, using AIA Document G702, Application and Certificate of Payment, as the cover sheet. Continuation sheets showing in detail the amounts requested, etc., shall be submitted using AIA Document G703, Continuation Sheet, or a computerized version of these documents previously approved for use. The information provided on the continuation sheets in the Description of the Work and Scheduled

Values columns shall match the corresponding information shown on the approved Schedule of Values. All blank spaces on AIA Document G702, Application and Certificate of Payment, must be completed and the signatures of the Contractor and Notary Public shall be original on each form. By submitting his application for payment, the Contractor certifies that the individual signing the application is authorized to do so.

§ 9.3.5 The Contractor shall submit the Fort Bend ISD Subcontractor Progress Assessment Form with each application for payment requesting payment be made for Work performed by a subcontractor that qualifies as a "small business" pursuant to FBISD Board Policy CV (Local). The Contractor shall also ensure that, once Contractor makes the applicable payment to the Small Business Subcontractor, the Subcontractor completes the Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form in its entirety and Contractor agrees to submit the completed copies to Owner with the next application for payment. The completed Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form must be received by the Owner before any further payment will be made to Contractor for any Work performed.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect and Program Manager to the Owner, based on the Architect's and Program Manager's evaluation of the Work and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's and Program Manager's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, the 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 and Program Manager. 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 of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from the Subcontractors and material suppliers and other data 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.

§ 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 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 or Program Manager is able to make such representations to the Owner. The Architect or Program Manager may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the or part of a Certificate for Payment previously issued, to such extent 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 field 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 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 another contractor;

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;
7. Persistent 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 disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for 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 Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.5.5 If the work has not attained Substantial Completion by the date agreed upon and set forth in the Amendments, subject to extensions of time as described in the Contract Documents, Owner may, in sole discretion, direct Architect or Program Manager to withhold payment to Contractor to the extent necessary to reserve sufficient funds to complete the construction of the Project and to cover liquidated damages assessed against Contractor up to the time of the Application for Payment and to the time it is reasonably anticipated Substantial Completion will be achieved. The Owner shall not be deemed in default by reason of withholding payment as provided for in Sections 9.3.4, 9.4.3, 9.5.1, or this Section.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make progress payments in accordance with the following Section which shall be inserted as Article 5, Progress Payments, in the Owner-Contractor Agreement, AIA Document A101, 2017 Edition.

.1 Based upon the applications for payment and supporting documents submitted to the Architect by the Contractor and certification of the amount payable by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in the Contract Documents for the period ending the last day of the month as follows:

.2 Not later than twenty (20) working days following the first Wednesday of each month, ninety-five percent (95%) of the portion of the Contract Sum properly allocable to labor, materials, and equipment incorporated in the Work and ninety-five percent (95%) of the portion of the Contract Sum properly allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing, for the period covered by the Application for Payment, less the aggregate of previous payments made by the Owner. Applications for Payment shall be submitted by the first Wednesday of the month.

.3 Upon Substantial Completion of the entire Work, a sum sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect shall determine for all incomplete Work and unsettled claims as provided in the Contract Documents.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven 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. More specifically, if only five percent (5%) retainage is withheld by the Owner on payments to the Contractor, then the Contractor shall withhold only five percent (5%) retainage on payments to subcontractors; and subcontractors shall withhold only five percent (5%) retainage on payments to sub-subcontractors. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 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 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.

§ 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.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, 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 Within seven (7) calendar days of receipt of payment from the Owner, the Contractor shall pay each subcontractor, out of the amount of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payment to the Contractor on account of such 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. Owner is not obligated to monitor payments to Subcontractors or Sub-subcontractors, and nothing in this section shall create any right on the part of a Subcontractors or Sub-subcontractor against Owner, Architect or Program Manager. 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's failure to make payments within such time shall constitute a material breach of this Contract. Contractor shall include a provision in each of its Subcontractor's imposing the same payment obligations on its Subcontractors as are applicable to the Contractor hereunder, and if the Owner so requests, shall provide copies of such Subcontractor payments to the Owner. If the Contractor has failed to make payment 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.

§ 9.6.10 Contractor shall not withhold as retainage a greater percentage on Subcontractors or material men than the percentage Owner withheld as retainage from payments to the Contractor.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within ten days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within ten days after the date established in the Contract Documents, the amount certified by the Architect, then the Contractor may, upon seven additional days' notice to the Owner and Architect, 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.

§ 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.

§ 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 Contractor shall prepare and submit to the Architect 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. In order to initiate and facilitate the preparation of the Contractor's list of items to be completed or corrected (Punch List), the Architect and Program Manager, if requested by the Contractor, will inspect a few representative rooms with the Contractor's superintendent and the office project manager to assist the Contractor in the preparation of the Contractor's Punch List. The Contractor's superintendent shall participate in the preparation of the Contractor's Punch List that is submitted to the Architect and shall personally inspect each and every item himself before certifying to the Architect that listed items have been corrected. Should the Architect determine that the Contractor's Punch List lacks sufficient detail or requires extensive supplementation, the Punch List will be returned to the Contractor for revision and the inspection for determining the Date of Substantial Completion will be delayed until the Punch List submitted is a reasonable representation of the work to be completed. To further facilitate completion of the Work the Contractor's superintendent shall accompany the Architect and his consultants during their inspections and the preparation of their supplements to the Punch List and the superintendent shall record or otherwise take note of those supplementary items. The Architect will endeavor to furnish to the Contractor typed, hand-lettered, written or recorded supplements to the Punch List in a prompt manner; however, any delay in the Contractor's receiving said supplements from the Architect shall not be cause for a claim for additional cost or extension of time as the Contractor's superintendent shall have been in attendance during the inspections of the Architect and his consultants and will have been expected to take his own notes. Furthermore, a significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judges of what constitutes a significantly large number of items.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect 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, 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.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare 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 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.

§ 9.8.6 In order for the project or a major portion thereof to be considered substantially complete, the following conditions must be met:

- .1 All inspections by governmental authorities having jurisdiction over the project must have been finalized, any remedial work required by those authorities must have been completed, and Certificates of Occupancy and similar governmental approval forms must have been issued and copies delivered to the Owner and Architect.
- .2 All work, both interior and exterior, shall have been completed and cleaned except minor items which if completed after occupancy, will not, in the Owner's opinion, cause interference to the Owner's use of the building or any portion thereof. A significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judge of what constitutes a significantly large number of items.

The following items are a partial specific list of requirements, as applicable to the Project, that must be completed **prior** to established Substantial Completion of all portions of the work (Including the Substantial Completion of the

commissioning phase).

1. All fire alarm system components must be completed and demonstrated to the Owner.
2. Local fire marshal approval certificate, or similar Certificate of Occupancy from the governing agency, must be delivered to the Owner.
3. All exterior clean-up and landscaping must be complete.
4. All final interior clean-up must be complete.
5. All HVAC air and water balancing must be complete.
6. All required commissioning must be complete.
7. All Energy Management Systems must be complete and fully operational and demonstrated to the Owner.
8. All communications equipment, telephone system, and P.A. systems must be complete and demonstrated to the Owner.
9. All final lockset cores must be installed and all final Owner directed keying completed.
10. All room plaques and exterior signage must be completed.
11. All Owner demonstrations must be completed including kitchen equipment, HVAC equipment, plumbing equipment, and electrical equipment.
12. A final certificate of occupancy must be signed by the Contractor and delivered to the Owner.

§ 9.8.7 After the date of Substantial Completion of the Project, as evidenced by the Certificate of Substantial Completion, G704 current edition, the Contractor will be allowed a period of thirty (30) days (unless extended by mutual agreement or provision of the Contract) within which to correct all deficiencies attached to the Certificate of Substantial Completion. Failure of the Contractor to complete such corrections within the stipulated time will be reported to the Contractor's Surety. In the report of deficiency, the Contractor and Surety will be informed that, should correction remain incomplete for fifteen (15) additional days, the Owner may initiate action to complete corrective work out of the remaining Contract funds in accordance with Section 14.2. Additional costs of the Owner, Architect, and other consultants incurred because of the Contractor's failure to complete the correction of deficiencies within thirty (30) days after the date of Substantial Completion (unless extended by mutual agreement or provision of the Contract) may be deducted from the funds remaining to be paid to the Contractor. Should corrective work following Substantial Completion require more than one reinspection after notification by the Contractor that corrections are complete, the cost of subsequent inspections may also be deducted from funds remaining unpaid to the Contractor.

§ 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 the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided 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 and 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.

§ 9.9.2 Immediately prior to such partial occupancy or use, 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 agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of 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 and, when the Architect and the Program Manager finds the Work acceptable under the Contract Documents and the Contractor fully performed, the Architect and the Program Manager will promptly prepare, sign and issue a Certificate of Final Completion and a final Certificate for Payment certifying to the Owner that, 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 terms and conditions of 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's 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.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and 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 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) 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, other data establishing payment or satisfaction of obligations, such as 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. Prior to final payment, the Contractor shall meet all of the requirements of Owner's Closeout Procedures. **§ 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 it shall not constitute a waiver of Claims.

(Paragraph deleted)

§ 9.10.4 The making of final payment shall constitute a waiver of 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 made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.10.6 Final Payment, constituting the entire unpaid balance of the Contract Sum, shall be paid by the Owner to the Contractor thirty-one (31) days after Substantial Completion of the Work unless otherwise stipulated in the Certificate of Substantial Completion, provided the Work has then been completed, the Contract fully performed, all Contract Close Out Documents have been submitted, and the Final Certificate for Payment has been issued by the Architect. The final payment will not be made until all of these conditions have been satisfied. **§ 9.10.7** 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 the 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 assume the responsibility for any damages to the Work caused by such occupancy.

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.

§ 10.1.1 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 Contractor 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 USC Section 651 et seq., and all amendments thereto. However, the Contractor's duties herein shall not relieve any Subcontractor and 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.

§ 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 controlled substance, or use, possess, distribute, or sell alcoholic beverages while on Owner's premises. No person shall use, possess, distribute, or sell illicit or unprescribed controlled drugs or drug paraphernalia; misuse legitimate prescription drugs; or act in contravention of warnings on medications while performing the Work or on Owner's premises.

§ 10.1.3 Contractor has implemented its own Safety Manual 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 accident 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 alcohol or drug test.

§ 10.1.4 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). Owner has also banned the presence of all weapons on the Project site, whether or not the owner thereof has a permit for a concealed weapon, and the Contractor agrees that the Contractor's representative, employees, agents, and sub-contractors will abide by the same.

§ 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 and other persons who may be affected thereby;
- .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 trees, shrubs, lawns, walks, 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.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards, for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property

adjacent to the Project and improvements therein. Any damage to such property for improvements shall be promptly repaired by the Contractor. Contractor shall provide reasonable fall protection safeguards and provide approved fall protection safety equipment for use by all exposed Contractor employees.

§ 10.2.4 When use of storage of hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such 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 explosives materials on Owner's property is prohibited unless expressly approved in advance by authorities having jurisdiction and 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. 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 which meets or exceeds the minimum requirements set forth in the provisions of the FBISD Safety Plan. 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. Seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto, and to enforce and comply with all 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 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 permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party 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, 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 notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.9 The performance of the foregoing services by the Contractor shall not relieve the Subcontractors of their responsibilities for the safety of persons and property and for compliance with all applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to the conduct of the Work.

§ 10.2.10 The Contractor shall be responsible for taking all precautions necessary to protect the Work in place from any foreseeable weather conditions which could cause any potential damage to portions or all Work in place. The Contractor shall be responsible for performing all repairs and/or replacement of any Work that results from foreseeable weather conditions.

§ 10.2.11 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 cause death, personal injury, or property damage, giving full details and statement of any witness. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner, Program Manager and the Architect.

§ 10.2.12 The Contractor shall be responsible for the protection and security of the Work until it receives written notification that the Substantial Completion of the Work has been accepted by the Owner.

§ 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. 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 encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. The Owner, Contractor and Architect shall then proceed in the same manner described in Section 10.3.2.

§ 10.3.1.1 Owner and Contractor may enter into a separate agreement and/or Change Order for Contractor to remediate and/or render harmless the Hazardous Substance, but Contractor shall not be required to remediate and/or render harmless the Hazardous Substance absent such agreement. Contractor shall not be required to resume work in any area affected by the Hazardous Substance until such time as the Hazardous Substance has been remediated and/or rendered harmless.

§ 10.3.2 Upon receipt of the Contractor's 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.

(Paragraphs deleted)

§ 10.3.7 As part of the construction contract close out process, and prior to receiving payment of any of the retainage, the Contractor and his subcontractors shall submit notarized statements pertaining to the above referenced hazardous materials.

§ 10.4 Emergencies

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.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

The Owner reserves the right to review the insurance requirements during the effective period of any Contract to make reasonable adjustments to insurance coverages and limits when deemed reasonably prudent by Owner based upon changes in statutory laws, court decisions or potential increase in expense to loss.

(Paragraphs deleted)

§ 11.2 § 11.2.1 § 11.2.2 § 11.2.3 § 11.2.4 § 11.2.5 § 11.2.6 intentionally deleted.

Please refer to Exhibit A to AIA Document A133-2009, Insurance and Bond Requirements.

(Paragraphs deleted)

§ 11.3 The Owner requires that the following insurance requirements be satisfied:

- .1 No Work shall be commenced until all insurance requirements set forth in this Agreement have been approved by the Owner in writing.
- .2 All insurance policies and certificates required hereunder shall be in form and content satisfactory to the Owner.
- .3 The Owner shall be furnished an ACORD form Certificate of Insurance evidencing all policies and endorsements required by this Agreement prior to execution of the Contract and thereafter upon renewal or replacement of each required policy of insurance.
- .4 Each Insurance coverage/policy shall contain a provision that at least thirty (30) days prior written notice shall be given to the Owner in the event of cancellation, material change, or non-renewal.
- .5 Insurance shall be underwritten by a company licensed to do business in Texas, satisfactory to Owner and rated minimum A-VII by A.M. Best.
- .6 The insurance coverages specified herein shall be maintained at all times during the term of the contract and, with the exception of builder's risk coverage, shall be maintained for a minimum of one (1) year thereafter.
- .7 No deletions/exclusions from the standard coverage form are allowed without the prior written consent of the Owner.
- .8 All insurance except Professional Liability must be issued on an occurrence basis.
- .9 The Contractor shall be responsible for all deductibles; the Owner shall approve the deductibles selected.
- .10 With the exception of Excess Umbrella Coverage, the coverage afforded by each carrier must be a primary over any other applicable insurance.
- .11 In addition to certificates of insurance, copies of policy endorsements must be provided (a) listing the Owner as Additional Insures, and (b) showing waivers of subrogation in favor of the Owner.

§ 11.4 Performance Bond and Payment Bond

§ 11.4.1 The Contractor shall provide a Performance Bond, in the penal sum equal to one hundred percent (100%) of the Contract Sum, if the formal Contract is in excess of One Hundred Thousand Dollars (\$100,000.00) and a Labor and Material Payment bond, in the penal sum equal to one hundred percent (100%) of the Contract sum if the formal contract is in excess of Twenty Five Thousand Dollars (\$25,000.00).

§ 11.4.2 The Work will not be started until the bonds and issuing companies have been accepted as satisfactory by the Owner. The original bonds will be delivered to the Owner with an attached authorized power of attorney. Such Bonds shall be issued by a company authorized to do business in the State of Texas with an A.M. Best Company rating of a least A-X and included on the U.S. Department of the Treasury Listing of Approved Sureties (Dept. Circular 570).

§ 11.4.3 The Performance Bond Form and the Payment Bond Form included herein shall be executed and submitted to the Architect in duplicate prior to commencement of the work. The surety companies must be acceptable to the Owner and licensed admitted carriers in the State of Texas; and the companies must appear in a current Federal Treasury list as Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring companies.

§ 11.4.4 Each bond shall be of penal sum equal to one hundred percent (100%) of the Contract Sum and shall be compatible with the provisions of the governing authority. The Contractor shall file copies of each bond with the county clerk and furnish the Owner with a file receipt. The bonds shall remain in force throughout the warranty period of the contract. The Work will not be started until the bonds and issuing companies have been accepted as satisfactory by the Owner. The original bonds will be delivered to the Owner with an authorized power of attorney attached.

§ 11.4.5 Claims must be sent to the Contractor and his Surety in accordance with Article 5160, Revised Civil Statutes. The Owner will furnish in accordance with such Article, a copy of the Payment Bond as provided therein to claimants upon request. All claimants are cautioned that no lien exists on the funds unpaid to the contractor on such Contract, and that reliance on notices sent to the Owner may result in loss of their rights against the Contractor and/or his Surety.

The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no responsibility because of any representation by any agent or employee.

§ 11.5 Worker's Compensation Insurance

§ 11.5.1 Comply with the requirements of Rule 28, TAC §110.110, Reporting Requirements for Building or Construction Projects for Governmental Entities

§ 11.5.2 Definitions:

- .1 Certificate of coverage ("certificate"). 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-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing service as on a project, for the duration of the project.
- .2 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 has been completed and accepted by the governmental entity.
- .3 Persons providing services on the project ("subcontractor" in §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 has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity which furnishes persons to provide services on the project. "Services" include without limitation, providing hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply delivery, and delivery of portable toilets.

§ 11.5.3 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, Section 401.011(44) for all employees of the Contractor providing services on the project, for the duration of the project.

§ 11.5.4 The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

§ 11.5.5 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 governmental entity showing that coverage has been extended.

§ 11.5.6 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 projects 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 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.

§ 11.5.7 The Contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

(Paragraphs deleted)

§ 11.5.8 The Contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 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.

§ 11.5.9 The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Worker's Compensation, 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 coverage.

§ 11.5.10 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 meet the statutory requirements of Texas Labor code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project.
- .2 Provide 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 shown on the current certificate ends during the duration of the project.
- .4 Obtain from each other person with whom it contracts, and provides 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 one year thereafter.
- .6 Notify the governmental entity in writing by certified mail or personal delivery, within 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 these subsections (1)-(7), with the certificates of coverage to be provided to the person for whom they are providing services.

§ 11.5.11 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 actions.

§ 11.5.12 The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the governmental entity to declare the contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

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 request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, 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 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 shall 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 Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before 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 services and expenses made necessary thereby, shall be at the Contractor's expense. The Owner may make emergency repairs to the Work or take such other measures necessary under the circumstance, 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.

§ 12.2.1.1 In the event of failure of a specified project, either during construction or the correction period, the Contractor shall take appropriate measures with the manufacturer of the product to assure correction or replacement of the defective products.

§ 12.2.1.2 Refer to 01 77 00, Closeout Procedures in Division One for further terms regarding warranties which will be required prior to final payment.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 Approximately eleven months after substantial completion, the contractor shall accompany the Owner and Architect on an "end of the one year correction period" reinspection of the Project. Additional deficiencies observed or reported shall be corrected by the Contractor.

§ 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 completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 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 of 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.

§ 12.2.5 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.

§ 12.3 Acceptance of Nonconforming Work

§ 12.3.1 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.

§ 12.3.2 The Owner's use and/or occupancy of any or all of the Project site shall never be construed as an acceptance of Work not in conformance with Contract Documents. The Owner reserves the right to enforce provisions of the Contract unless the Owner's acceptance is provided to the Contractor in writing.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where 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.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole 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.

§ 13.2.2 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. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 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, 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.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may 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 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.

§ 13.4.3 If 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 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.

§ 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

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate 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.

§ 13.7 Equal Opportunity

§ 13.7.1 The contractor shall maintain policies of employment as follows:

.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion 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 policies of non-discrimination.

§ 13.8 Criminal Background Checks

The Contractor/Subcontractor shall certify the Criminal Background Check, as stated in Fort Bend ISD Board Policy CJA and the form included herein, as required by Texas Education Code Section 22.0834 and Texas Administrative Code Section 153.1101 and 153.1117, and shall comply with all requirements of such laws and policy.

§ 13.9 Required Certifications

Contractor hereby certifies that it is not a company identified on the Texas Comptroller's list of companies known to have contracts with, or provide supplies or services to, a foreign organization designated as a Foreign Terrorist Organization by the U.S. Secretary of State under federal law. Contractor hereby certifies and verifies that neither Contractor, nor any affiliate, subsidiary, or parent company of Contractor, if any (the "Contractor Companies"), boycotts Israel, and contractor agrees that Contractor and Contractor Companies will not boycott Israel during the term of this Agreement. For purposes of this Agreement, the term "boycott" shall mean and include terminating business activities or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory.

Contractor verifies that: (1) it does not, and will not for the duration of the contract, boycott energy companies or (2) the verification required by Section 2274.002 of the Texas Government Code does not apply to the contract.

Contractor verifies that: (1) it does not, and will not for the duration of the contract, have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association or (2) the verification required by Section 2274.002 of the Texas Government Code does not apply to the contract.

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 30 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, for any of the following reasons:

- .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;
- .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 on a 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, 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, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, 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 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 seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, 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' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession 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.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. 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 Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.2.5 The Contractor hereby assigns the Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1 et. Seq. (1973).

§ 14.2.6 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.

§ 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 and Contract Time shall be adjusted 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. 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.

§ 14.4.2 Upon receipt of 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 the case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed up to date of receipt of the notice of termination, plus costs of demobilization.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, 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 party 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.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims 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 any case not more than 10 years after the date of Substantial Completion of the Work.

§ 15.1.3 Notice of Claims

§ 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 notice to the other party 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 either party must be initiated within ninety (90) days after occurrence of the event giving rise to such Claim or within ninety (90) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. 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.

§ 15.1.3.2 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 notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 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 Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 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 No extensions of the Contract Time will be granted for inclement weather, except as stated in Section 8.3.1.

(Paragraphs deleted)

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those arising under Sections 11.3.9 and 11.3.10, or claims alleging an error or omission by the Architect, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. If the parties are unable to agree, any claim, dispute or matters arising out of the contract between the Architect, Owner and Contractor or any combination of those parties shall be submitted to a court of appropriate jurisdiction.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) 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 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 Initial Decision Maker in 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 If the 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 Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the 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 therefore; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision 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, if both parties so agree, and subject to legal or equitable proceedings in a court having jurisdiction thereof. It is understood and agreed that, in the event that any dispute, controversy, or conflict arises during the design and construction of the Project or following its completion, the parties hereto will cooperate in good faith, if possible, to resolve the issues without resorting to litigation.

(Paragraphs deleted)

Init.

§ 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.

(Paragraph deleted)

§ 15.2.9 The prevailing party in any judicial proceeding arising from the Contract Documents shall recover its reasonable and necessary attorneys' fees.

§ 15.3 Mediation

(Paragraph deleted)

§ 15.3.2 The parties may mutually agree to resolve their claims by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect. Request for mediation shall be filed in writing with the other party to the Contract. Mediation shall proceed in advance of legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing unless stayed for a longer period of agreement of the parties or court order.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

(Paragraphs deleted)

ARTICLE 16 Contractor Accounts, Records, and Inspection

Contractor 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 shall make such 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 the respective agents. Job Records must be retained by Contractor for at least seven (7) years after the date of Final Completion of the Project. Furthermore, the Contractor shall promptly provide copies, including by electronic means, of all documents that may be required by the State Public Information Act.

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 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 Fort Bend 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 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.



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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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Additions and Deletions Report for AIA® Document A201® – 2017

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PAGE 1

(Name, legal status and address)

Fort Bend Independent School District
16431 Lexington Boulevard
Sugar Land, Texas 77479

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The Contract Documents 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), Performance Bond, Labor and Material Payment Bond, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, Agreement 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~~, Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to ~~bid, Instructions to Bidders, propose, instructions to Proposers, sample forms, other information~~ furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's ~~bid or proposal, Proposal~~ or portions of Addenda relating to ~~bidding or proposal requirements, proposal requirements~~).

...

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. It also includes all 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 and all other items of cost or value needed to produce, construct and fully complete the public work identified by the Contract Documents. Nothing in these Conditions shall be interpreted as imposing on either the Owner or the Architect, or their respective agents, employees, officers, directors or consultants, any duty, obligation or authority with respect to any items that are not intended to be incorporated into the completed Project, or that do not comprise the Work, including, without limitation, shoring, scaffolding, hoists, weatherproofing, or any temporary facility or activity, since these are the sole responsibility of the Contractor.

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§ 1.2.1.2 Precedence of the Contract Documents: The most recently issued Document takes precedence over previous issues of the same Document. The order of precedence is as follows with the highest authority listed as "1".

- .1 Contract Modifications (such as Change Orders) signed by the Contractor and Owner.
- .2 The Agreement. (AIA Document A101-2017)
- .3 The General Conditions of the Contract for Construction
- .4 Addenda, with those of later date having precedence over those of earlier date

.5 Drawings and Specifications

Should these Documents disagree in themselves, the Architect and Owner will select the appropriate method for performing the Work, to facilitating avoiding increase in the Contract cost. If an item is shown one place in the Drawings, but no 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.

§ 1.2.1.3 Relation of Specifications and Drawings: To be equivalent in authority and priority. Should they disagree in themselves, or with each other, prices shall be based on the most expensive combination of quality and quantity of Work indicated. In the event of the above mentioned disagreements, the resolution shall be determined by the Architect and Owner.

...

§ 1.2.4 In the case of inconsistency within or between the Drawings and Specifications discovered prior to Proposal Submission Time but too late to be clarified by an Addendum, the better quality or greater quantity of Work shall be included in the Proposal. Clarification of any inconsistency will be accomplished with the Contractor after award of Contract and, if necessary, an appropriate reduction in the Contract will be accomplished by Change Order.

§ 1.2.5 Product 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 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 Relations of Specifications and Drawings. 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.

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§ 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 Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer at the corporation for which it was intended, or if delivered at or sent by certified mail, or 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 delivered by facsimile or other electronic communications to the offices of the person or corporation for which it was intended. For facsimiles or other electronic communications received after 5:00 p.m. on a business day, or on a weekend or legal holiday on which the recipient's offices are closed, notice 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 on the next business day.

§ 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.

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§1.9 Miscellaneous Other Definitions

§1.9.1 Addenda, Addendum. Documents issued by the Architect prior to execution of the Owner Contractor Agreement for this Project that modify or clarify the Proposal Documents. All addenda become a part of the Contract Documents.

§1.9.2 Alternate Proposal(s). A separate amount stated on a separate Proposal Form which, if accepted by the Owner, will be added to or deducted from the Base Proposal. If accepted, the work that corresponds to the alternate proposal will become part of the agreement between Owner and Contractor. Alternate proposals shall remain valid for the same period of time as the Base Proposal after receipt of proposals, regardless if an Owner Contractor Agreement has been executed, unless indicated otherwise herein.

§1.9.3 Approved, Approved Equivalent, Approved Equal, or Equal. The terms Approved, Approved Equivalent, Approved Equal, and Or Equal, relate to the substitution of products or systems approved in writing by the Architect. Refer to Paragraph 3.4.2, Substitution of Products and Systems, for procedures which must be followed after award of contract. The substitution procedure process to be followed prior to receipt of proposals is described in the Instructions to Bidders.

§1.9.4 Base Proposal. The Contractor's proposal for the Work, not including any Alternates.

§1.9.5 Contract Time. The period of time which is established in the Contract Documents for Substantial Completion of the Work. This period of time is subject to authorized adjustments as enumerated in the Contract Documents.

§1.9.6 Date of Agreement. The date the Owner formally awards a Contract for Construction of the Work. This date will be inserted in the first page of the Agreement between Owner and Contractor and shall be referenced in Performance Bond and Payment Bond forms. See also Date of Commencement of Work.

§1.9.7 Date of Commencement of the Work. The date of a written Notice to Proceed to the Contractor for a given portion of the Work. This date constitutes day zero (0) of the stated Contract Time. The Notice to Proceed will be issued after the District has received and validated the Contractor's Payment Bond, Performance Bond and Insurance.

§1.9.8 Date of Final Completion. The end of construction. See AIA Document A201, Section 9.10.

§1.9.9 Day. The following days are referenced in the documents:

- .1 Calendar Days:** The Contract Time is established in Calendar Days and extensions of time granted for Regular Work Days lost, if any, will be converted to Calendar Days.
- .2 Holidays:** The days officially recognized by the construction industry in this area as a holiday; normally limited to the observance days of New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and the day after and Christmas Day.
- .3 Regular Work Days:** All calendar days except holidays, Saturdays, and Sundays. Requests for extensions of time shall be requested on the basis of Regular Work Days, and those days, if approved, will be converted to calendar days by multiplying by a factor of one and four-tenths (1.4).
- .4 No extensions of the Contract Time will be granted due to inclement weather except as stated in Section 8.3.1.**

§ 1.9.10 Final Completion. Achieved after the Work has been completed by the Contractor, the final inspection has been performed by the Architect and the Owner, the Contract Closeout process has been completed, and the final Certificate for Payment has been issued by the Architect to the Owner. See Sections 1.1.14 and 9.10 and Specification sections regarding Contract Close Out.

§1.9.11 Notice to Proceed. A notice that may be given by the Owner to the Contractor that directs the Contractor to start the Work. It may also establish the Date of Commencement of the Work.

§ 1.9.12 The Project Manual. A volume assembled for the Work which may include the Proposal requirements, sample forms, Conditions of the Contract, Drawings and Specifications.

§ 1.9.13 Proposal. A complete and properly signed proposal to do the Work for the sums stipulated therein, submitted

on the prescribed forms in accordance with the Proposal Documents.

§ 1.9.14 Proposal Documents. All documents and bound into or referenced in the Project Manual, the Drawings, and Addenda related thereto. The Project Manual contains the Proposal requirements, Contract and other forms, Conditions of the Contract, the Specifications, and a list of Drawings and Schedules, some of which are bound into the Project Manual (other Drawings and Specifications are bound separately).

§ 1.9.15 Proposer. A person or entity who submits a Proposal.

§ 1.9.16 Provide. Whenever the word "provide" is used in these documents, it shall mean the same as "furnish and install".

§ 1.9.17 Punch List. A comprehensive list prepared by the Contractor prior to Substantial Completion to establish all items to be completed or corrected; this list may be supplemented by the Architect or Owner. See AIA Document A201, Section 9.8.

§ 1.9.18 SMALL BUSINESS ENTERPRISE PROGRAM ("SBEP"). Owner has adopted the SBEP to provide increased business opportunities for locally certified small businesses to competitively participate in contracting and procurement within FBISD. See FBISD Board Policy CV(Local).

§ 1.9.19 SUB-PROPOSER. A person or entity who submits a Proposal to a Proposer for materials, equipment or labor for a portion of the Work.

§ 1.9.20 Unit Prices. A cost for a unit of work as described in the Contract Documents. The Owner may add or deduct Unit Price work at the amounts stated on the Proposal Form and such amounts shall not be subject to additional mark up by the Contractor or his subcontractors."

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§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. ~~The Owner shall designate in writing a representative who shall have express~~ All parties understand that only the Board of Trustees for the Owner acting as a body corporate has the authority to bind the Owner 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. Board's approval under current policy of the Board of Trustees for the Owner, including, but not limited to, Change Orders. Except as otherwise provided in Section 4.2.1, the Architect does not have authority to bind the Owner with respect to matters requiring the Owner's approval or authorization.~~ 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.~~

§ 2.1.2 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, to approve a Change Order requiring an increase in the Contract Sum, or agree to an extension to the contractual Completion Date, unless this authority is lawfully delegated. Neither Architect nor Contractor may reply upon the direction of any employee of Owner or Program Manager who has not been designated in writing by the Superintendent of Schools or Board of Trustees of Owner; Owner shall not be financially responsible for actions taken by the Architect or Contractor in reliance upon direction from unauthorized persons.

§ 2.1.3 The presence of the Owner, Program Manager or Architect at the Work site does not imply acceptance or approval of the Work.

§ 2.1.4 The Owner, being a public body under the laws of the State of Texas, must have funds in the full amount of the Contract on hand prior to award and execution of the Contract. Furthermore, no Contract exists between the Owner and the Contractor until the formation of the Contract is approved by a majority of the Board of Trustees of the Owner in open session at a duly held Board meeting, and the contract is signed by an authorized Owner's representative.

§ 2.1.5 At any time prior to the Owner's receipt of the executed Agreement with the required bonds and insurance, the Owner may, at its sole option and without cause, reject the offer described in this Agreement 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, shall cause no obligation or duty to the Owner save return of bid or proposal security, if any, if rejection is without cause. This section does not pertain to rejection for cause by the Owner, or for the Contractor's failure to provide required bonds or insurance.

§ 2.2.1 Prior to 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. 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 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 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.

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§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2. The Contractor shall pay the cost of reproduction, postage, and handling of all sets of Drawings and Specifications necessary for the Contractor to execute the Work. If the Contractor requests in writing that the Architect and his Consultants update the original Drawings and Specifications to incorporate Addendum items, or Modifications, the Architect and his Consultants will do so at their expense. However, the Contractor shall pay the cost of reproduction, postage and handling of all sets of Drawings and Specifications necessary for the Contractor to execute the Work.

...

If the Contractor defaults or neglects to carry out the Work-work in accordance with the Contract Documents and fails within a ten-day period fails, after receipt of written notice from the Owner-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 the Architect may, 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 deficiencies. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the actual cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments Architect, Program Manager and other consultants' additional services and expenses made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to the prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, 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, the Contractor may file a Claim pursuant to Article 15-Owner within thirty (30) days of receipt of written notice from the Owner therefor.

§ 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

§ 2.7 Owner's Right to Occupy the Project

§ 2.7.1 The Owner shall have the right to occupy or use without prejudice to the right of either party, any completed or largely completed portions of the project, notwithstanding the time for completing the entire work or such portions may not yet have expired. Such occupancy and use shall not constitute acceptance of any work not in accordance with the Contract Documents. If the Contractor determines that said occupancy may cause a delay to the completion of the project, he shall notify the Owner in writing immediately.

§ 2.7.2 Refer to Article 11 Insurance and Bonds regarding property insurance requirements in the event of such occupancy.

§ 2.7.3 If Contractor has not completed the obligations of the Contract Documents by the dates established by subsequent Amendments to the Agreement Between Owner and Construction Manager, the Owner shall have the right to occupy or use the entire project.

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§ 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, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 The Contractor must be fully qualified under any state or local licensing laws for Contractors in effect at the time and at the location of the work. The Contractor is responsible for determining that all of his subcontractors and prospective subcontractors are duly licensed in accordance with the law.

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§ 3.2.4 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, 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, 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. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or ~~Architect~~ 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~~ authorities provided such errors, inconsistencies, omissions, differences, or nonconformities could not have been ascertained from a careful study of the Contract Documents.

§ 3.2.5 The Contractor shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation or initiating a Request for Information (RFI). The Contractor shall not ask the Architect for observation of work prior to the Contractor's field superintendent's personal inspection of the work and his determination that the work complies with the Contract Documents. The Contractor shall arrange meetings for the Architect, prior to commencement of the Work, with all major subcontractors, to allow the subcontractor to demonstrate his understanding of the documents to the Architect and to allow the subcontractor to ask for any interpretation he may require. 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.

§ 3.2.6 If, in the opinion of the Architect and the Program Manager, the Contractor does not make a reasonable effort to comply with the above requirements of the Contract Documents and this causes the Architect or his Consultants to

expend an unreasonable amount of time in the discharge of the duties imposed on him by the Contract Documents, then the Contractor shall bear the cost of compensation for the Architect's additional services made necessary by such failure. The Architect will give the Contractor prior notice of intent to bill for additional services related to Sections 3.2.5, 3.2.6 and 3.7 before additional services are performed.

§ 3.2.7 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, he shall promptly notify the Architect in writing, providing substantiation for his position. Any necessary changes, including substitutions of materials, shall be accomplished by appropriate Modification. If the Contractor fails to perform the obligations of Section 3.2.1 and 3.2.2, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations.

§ 3.2.8 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 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 construction work, and shall be responsible for any loss, damage, or extra expense resulting from such damage. The Contractor and each Subcontractor shall evaluate and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including

<u>.1</u>	<u>the location, condition, layout and nature of the Project site and surrounding areas;</u>
<u>.2</u>	<u>generally prevailing climatic conditions;</u>
<u>.3</u>	<u>anticipated labor supply and costs;</u>
<u>.4</u>	<u>availability and cost of materials, tools and equipment; and</u>
<u>.5</u>	<u>other similar issues.</u>

§ 3.2.9 Contractor shall be responsible for any damage done to such lines, cables, pipes and pipelines during its construction work resulting from its negligent conduct

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§ 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 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 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 to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures. written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures, but only to the extent the Owner would be responsible for any such losses or damages under state and/or federal law.

§ 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 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 Contractors'

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 any controlled substance, carrying weapons, speaking profane and/or offensive language, or engaging in any inappropriate interactions of any nature whatsoever with students, and teachers, staff and visitors, including talking, touching, staring or otherwise contributing to a hostile or offensive environment for Owner's students and staff. 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. 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 termination of the employment of the offending employee from all construction on any of Owner's property and immediate removal from the site.

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§ 3.3.4 The Contractor is especially cautioned to coordinate the routing of mechanical and electrical items prior to commencing these operations.

§ 3.3.5 Contractor shall bear sole responsibilities for design and execution of acceptable trenching and shoring procedures, in accordance with Texas Government Code, Section 2166.303 and Texas Health and Safety Code, Subchapter C, Sections 756.021, et seq. On trench excavations in excess of 5 feet in depth, Contractor shall pay a qualified engineer, experienced in the engineering design and preparation of drawings and specifications for compliance with state requirements for trenching and shoring, to prepare and professionally seal detailed drawings and specifications directing Contractor in the safe execution of trenching and shoring.

§ 3.3.6 Any time that the Contractors' 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 are on site, the work shall be supervised by a qualified employee of the Contractor.

§ 3.3.7 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 obligation 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 Section 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 Occupational Safety and Health Administration

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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 consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. The materials, products, and the systems covered by these specifications have been selected as a standard because of quality, particular suitability, or record of satisfactory performance. It is not intended to preclude the use of equivalent or better materials, products, or systems provided that same meets the requirements of the particular project and have been approved in an addendum as a substitution prior to the submission of bids. If prior written approval in an addendum has not been obtained, it will be assumed that the Bid is based upon the materials, products, and systems described in the Bidding Documents and no substitutions will be permitted, except as provided hereinafter.

.1 If, after award of contract, the Contractor or one of his Subcontractors, or Suppliers determines 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 the Warranty, the Contractor shall promptly notify the Architect, in writing, providing detailed substantiation for his position. Any changes deemed necessary

by the Owner and Architect, including substitution of materials and change in Contract Sum, either upward or downward, if any, shall be accompanied by appropriate Modification.

.2 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products on the Work in place of those specified only under the conditions set forth in specification referring to Product Options and Substitutions.

.3 Requests for substitution, received by the Architect later than forty five (45) days after "Notice to Proceed" or "Date of Commencement of the Work" (whichever occurs first), may result in additional costs to the Owner. Contractor agrees to reimburse the Owner through deductive Change Order to the Contract, for all costs associated with such requests.

.4 By making request for substitutions based on Subparagraph 3.4.2 above, the Contractor

.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equivalent or superior in all respects to that specified, and is suitable for the intended purpose;

.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

.5 Substitution requests shall be submitted on the forms included herein and in accordance with the process established in specification referring to Product Options and Substitutions.

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.1 State law prohibits possession and/or use of alcohol and tobacco products on school property at all times.

.2 State law prohibits weapons or firearms on school property.

.3 There shall be zero tolerance for fraternization with students, teachers and any other school district personnel, Contractor will immediately remove any employee that violates this provision from the project.

.4 No glass bottles shall be brought on the construction site or Owner's property by any construction personnel.

.5 Background checks

Contractor must give advance notice to the Owner 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 Owner may terminate this Agreement pursuant to Article 14 Termination if the Owner determines that the person or business entity failed to give notice as required by this section or misrepresented the conduct resulting in the conviction. This section requiring advance notice does not apply to a publicly held corporation. 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 OR CONTRACTOR'S FORCES' NON-COMPLIANCE WITH CRIMINAL LAW.

§ 3.4.4 The Contractor shall disclose the existence and extent of any financial interests, whether director indirect, such Contractor may have in any Subcontractor or material supplier which the Contractor may propose for this Project.

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§ 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-new, unless the Contract Documents require or permit otherwise. The Contractor 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. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused-cause by abuse, alterations-material alteration to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, insufficient maintenance or maintenance not in compliance with written instructions therefor, operation not in compliance with written instructions therefor, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall

furnish satisfactory evidence as to the kind and quality of materials and equipment. The warranties set out in this section are not exclusive of any other warranties or guarantees set out in other places in the Contract Documents or implied under applicable law.

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§ 3.5.3 In the event of failure in the Work, including a specified product, whether during construction, or the correction period (which shall be one (1) year from the Date of Substantial Completion, except where a longer period as specified), the Contractor shall take prompt and appropriate measures to assure correction or replacement of the defective Work or any portion thereof, including manufactured products, whether notified by the Owner or the Architect. Upon correction of warranty items, the Contractor shall provide the Owner and Architect with written notification of said correction. This obligation shall survive acceptance of the Work under the Construction Contract.

§ 3.5.4 The Contractual Correction Period for this Project is one (1) year from the date of Substantial Completion, except for any extended warranties as specified within the Contract Documents. Items of Work not completed until after the deadline for Substantial Completions shall have their warranties (general and any extended warranty periods) extended by the period of time between the deadline for Substantial Completion and the actual completion of the Work. Such warranties shall be submitted to the Owner in writing, documenting such time extensions. This correction period shall not restrict or modify extended warranties called for or provided on systems, equipment or other specific portions of the Work.

§ 3.5.5 The Contractor shall accompany the Owner and Architect for a complete reinspection of the Project approximately eleven (11) months after the Date of Substantial Completion and shall promptly complete any observed or reported deficiencies in the Work, including any uncompleted Punch List items or outstanding and incomplete warranty items. The contractor shall provide written notification to the Owner and Architect when said Punch List items and/or additional deficiencies observed have been corrected. This obligation shall survive acceptance of the Work under the Construction Contract.

§ 3.5.6 Contractor shall certify that the Project has been constructed in conformance with the Architect's or Engineer's plan, specifications, and Contract 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 Section 61.1036(c) (3) (F). The Contractor shall deliver to the Owner its written guarantee, in the form attached to this contract as Exhibit "F", guaranteeing all of the work under the contract to be free from faulty materials in every particular, and free from improper workmanship, and against injury except from proper and usual wear and tear; and agreeing to replace or re-execute without cost to the Owner such work as may be found to be improper, imperfect or of unsatisfactory material and/or workmanship, without cost to the Owner, and to make good all damage caused to other work or materials, or to the Owner's property, real and personal, due to such improper, imperfect or faulty material and/or workmanship, and/or due to the required replacement or re-execution. Such warranty periods shall be maintained notwithstanding that certain systems may be activated prior to Substantial Completion as required for the satisfactory completion of the project. This guarantee shall be made to cover a period of one (1) year from the date of Substantial Completion as certified by the Architect under this Contract. This guarantee must be furnished to the Owner and approved by it before acceptance and final payment is made.

Upon written notice from the Owner, the Contractor shall promptly remedy defects as covered by his guarantee. If Contractor does not respond to Owner's written notice, either by beginning corrective work or notifying the Owner in writing stating when work will begin, within ten (10) days of receipt, the Owner may take measures to correct the work himself and Contractor will be obligated to reimburse Owner's costs. If notice of defects covered by warranty is given in writing to the Contractor on a timely basis, the obligation to provide the warranty work may extend beyond the one year warranty period until the warranty defect is remedied and accepted by the Owner. The Contractor shall provide bond coverage to extend for the one (1) year period of the guarantee to insure performance under the terms of his obligation. The provisions of this section shall be in addition to, and not in lieu of, any other rights and remedies available to the Owner.

§ 3.5.6.1 All required warranties on equipment, machinery, materials, or components shall be submitted to the Architect and Program Manager on the manufacturer's or supplier's approved forms at the time of Substantial Completion.

§ 3.5.6.2 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 standard, 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 standard, or
- .3 such further reasonable proof as is required by the Architect.

§ 3.5.7 The warranties of Contractor provided in Sections 3.5.2 and 3.5.3 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 of 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.

§ 3.5.8 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 or final completion. Contractor shall maintain a complete and accurate schedule of the dates 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. 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

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 qualifies for exemption from State and Local Sales and Use Taxes pursuant to the provision of Article 20.04(f) of the Texas Limited Sales, Excise and Use Tax Act. Taxes normally levied on the purchase, rental and lease of materials, supplies and equipment used or consumed in performance of the Contract may be exempted by issuing to suppliers an exemption certificate in lieu of tax. Exemption certificates comply with State Comptroller of Public Accounts Ruling No. 95-0.07. Any such exemption certificate issued in lieu of tax shall be subject to State Comptroller of Public Accounts Ruling No. 95-0.09, as amended. Failure by the Contractor or Subcontractors to take advantage of the Owner's exemption and to obtain such exemption certificate shall make him responsible for paying taxes incurred on materials furnished on the Project without additional cost to or reimbursement by the Owner.

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- .1 The Owner shall pay directly to the governing authority the cost of all permanent property utility assessments and similar utility connection charges.
- .2 The Contractor shall pay directly all temporary utility charges (excluding permanent power), utility district/company inspection fees, temporary tap charges, and temporary water meter charges and any other similar fees assessed by jurisdictional authority having control over this Project. The Contractor shall secure and pay for all governing authorities' permit fees.
- .3 Fees payable to the Texas Department of Licensing and Regulation (TDLR) for document review relative to the Elimination of Architectural Barriers Act shall be paid by the Owner and the Architect will submit the documents to the TDLR for review and approval.
- .4 SWPPP

.5 The Contractor shall include in his base Proposal the permit fee required by Harris County. The Owner will be responsible for fees payable to the TDLR, any MUD and the Third-party plan reviewer.

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§ 3.7.6 The Contractor shall comply with the provisions of Section 22.0834 of the Texas Education Code and Section 153.1117 of the Texas Administrative Code. The form of certification by the Contractor shall be supplied by the Owner, and must be supplemented by the Contractor as required by law, or as requested by the Owner.

§ 3.7.7 The Contractor shall be responsible for timely notification to and coordination with all utility companies regarding the provision of or revising of services to the Project. The Contractor shall inform the Architect and Program Manager at once when the Owner's participation is required. 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, payment for permanent utility services shall be the responsibility of the Contractor until Substantial Completion.

§ 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, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection. All unused allowance amounts shall be credited back to Owner. No markup shall be allowed for the Contractor on any expenditures from Allowances or Contingency funds included in the Contract Sum.

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§ 3.9.1 The Contractor shall employ a competent superintendent, project manager and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as Work, including Punch List work. The superintendent and project manager shall represent the Contractor, and unless provided otherwise in Section 3.1.1, communications given to the superintendent or project manager shall be binding as if given to the Contractor.

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§ 3.9.3 The Contractor shall 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. In the event a substitution of superintendent is necessary, the Contractor shall reimburse the Owner, Architect and his Consultants (on a reasonable hourly basis) for additional costs incurred due to said substitution. No increase in Contract Time or Contract Sum shall be allowed in the event the Owner or Architect objects to any nominated superintendent. The superintendent must be at the construction site acting in his supervisory capacity at all times when construction is in progress. A separate full-time superintendent will be required for each school site.

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§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall 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 Within 30 days of being awarded an Amendment, the Contractor shall prepare and submit for the Owner and Architect's review, a construction schedule for the Work, with critical path clearly defined. The schedule 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. For further schedule requirements refer to specification section regarding project schedules in the Project Manual.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall 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 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. Requirements for the submittal schedule are outlined in specification section 01 32 16, Construction Progress Schedules. 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 the Contract Sum or extension of the Contract Time based on the time required for review of submittals.

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§ 3.10.4 The Contractor shall submit to the Architect, with each monthly Application for Payment; a copy of the progress schedule updated to reflect the current status of the project. All schedule updates shall address the subject of how the Contractor intends to address any critical path delays previously encountered. The schedule and all updates should address submittal activities as well as actual field construction activities. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The Contractor's schedule shall be prepared in a format which at a minimum graphically portrays (1) the beginning and duration for each phase of the Work described in those specification sections included in the Project Manual, (2) a critical path, meaning a limited sequence of critical activities, which establishes a linked sequence of each critical activity, a delay to any of which will cause a delay in completion of the Work, and (3) the float, indicating an activity or sequence which does not necessarily have to start or end on the scheduled date(s) to maintain the 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 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 the 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 General Conditions as progress reports) as set forth in Section 3.10.1 or if requested by either the Owner or the Architect. The Contractor shall take whatever action necessary to assure that the project completion schedule is met.

§ 3.10.5 The Contractor's schedule may be considered when requested extensions of time are evaluated. 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 schedule 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. When it appears to Owner or Contractor that a Contract milestone or completion date cannot be met, Contractor will develop with the Owner, Program Manager and Architect a plan and a budget.

§ 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 Section 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Section 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, and 2) such rescheduling is required for the convenience of the Owner and is no attributable to any act or omission of Contractor.

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, 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, and

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed. § 3.11.1 The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, 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, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.11.2 In addition to any other requirement in the Contract Documents and prior to installation, Contractor is to furnish or cause subcontractor to furnish, for the Owner 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.

§ 3.11.1 The Contractor shall post all Addenda on Construction Documents prior to commencing work in the site.

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.1 Submittals shall be submitted at the earliest possible time in order to expedite delivery of critical or long lead time items. For more complex systems and equipment (such as structural steel; doors, windows and hardware; casework; mechanical, electrical, and plumbing systems and equipment; food service equipment; sound systems and the like), the Contractor shall schedule at least 30 days for the Architect or the Architect's Consultants' review and submittals shall be sequenced logically in accordance with the schedule, required fabrication and installation time.

.2 Where colors are to be selected by the Architect, the Contractor shall submit all product color samples in adequate time to allow the Architect to prepare a complete selection schedule. In general, all submittals requiring color selection shall be submitted to the Architect within four weeks of the date of the Contract for Construction. Regarding critical delivery items, wherever feasible, the Architect will release color selections on critical materials as they are needed.

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.1 If, in the opinion of the Architect, the Shop Drawings, Product Data, Samples and similar submittals are incomplete, indicate an inadequate understanding of the work covered by the submittals, or indicate a lack of study and review by the Contractor prior to submittal to the Architect, the submittals will be returned, unchecked, to the Contractor for correction of these three deficiencies and subsequent resubmittal. Additional service charges as outlined in 3.2.6 may be charged by the Architect in this event.

.2 The Architect will take no action on Shop Drawings, Product Data, and Samples that have not first been certified, by stamped, signed notation, as having been checked and approved by the Contractor for use in the Work, or that are not specifically required by the Contract Documents. § 3.12.6 By 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.

§ 3.12.6 By 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.

§ 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-accepted 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

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-acceptance 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 notice, the Architect's approval-acceptance of a resubmission shall not apply to such revisions.

§ 3.12.9.1 Deviation from the requirements of the Contract Documents indicated on shop Drawings, Product Data, and Samples, does not constitute the required notification "in writing."

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§ 3.12.11 The Contractor shall submit complete Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents to the Architect at least thirty (30) days prior to the date the Contractor needs the reviewed submittals returned. Where colors are to be selected by the Architect, submit all Samples in adequate time to allow the Architect to prepare a complete selection schedule. In general, all submittals requiring color selection shall be submitted to the Architect within four weeks of the date of the contact for construction.

§ 3.12.12 The Contractor shall submit digital PDF's of Shop Drawings, Product Data, and similar submittals in the proper format according to the procedures stipulated within the Contract Documents. Digitally submitted Shop Drawings will be reviewed and marked by the Architect and/or his consultants and returned to the Contractor for his use, distribution, correction or resubmittal as required. Contractor corrections or revisions shall be resubmitted to the Architect in accordance with same procedures. The digitally marked up prints will be retained by the Architect and his consultants. Samples shall be submitted directly to the Architect for review.

§ 3.12.13 The Contractor shall provide MEP coordination drawings within a schedule mutually agreed upon by the Team and prior to installing the Work, showing how all piping, ductwork, lights, conduit, equipment, etc. will fit into the ceiling space allotted, including clearances required by the manufacturer, by code, or in keeping with good construction practice. Space for all trade elements must be considered on the same drawing. Drawings shall be at 1/4 inch per foot minimum scale and shall include invert elevations and sections required to meeting intended purpose. The Contractor may propose an alternate method of accomplishing MEP coordination. If the alternate method is approved by the Team, it may be utilized.

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.
§ 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 promptly 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 any entity for which the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner.

§ 3.13.4 Contractor shall ensure that the Work, at all times, is performed in a manner that affords the Owner reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas 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 Contract Documents, Contractor shall use its best efforts to minimize any interference with the

occupancy or beneficial use of: 1) any area and buildings adjacent to the site or the Work or 2) 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. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended from time to time

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§ 3.14.3 Leave all chases, holes and openings, straight and true, of proper size, and cut them into existing work as may be necessary for the proper installation of the work. Consult with all Subcontractors concerned, regarding proper locations and size. In case of conflict between requirement for cutting and patching and any other requirement of the Work, submit request for direction before proceeding with the Work. In case of failure to leave or cut them in the proper place, openings shall be cut afterward at no expense to the Owner. No excessive cutting will be permitted, nor shall any piers or other structural members be cut without prior approval. After such work has been installed, satisfactorily and carefully fit around, close up, repair, patch, and point up all cuts. Work shall be done with proper tools by workmen of the particular trade to which work belongs and shall be done without extra expense to the Owner. No description of specific cutting, patching, digging, etc., required for the work under a Specification Section that may be required for the proper accommodation of that work to the work of other trades shall relieve the Contractor from responsibility described above.

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§ 3.15.3 Prior to the Architect's inspection for Substantial Completion the Contractor shall clean exterior and interior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces; clean equipment and fixtures to a sanitary condition; replace air filters in mechanical equipment; clean roof, 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; and make the Work ready in all respects for immediate and full use by the Owner.

§ 3.15.4 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor or deducted from the final payment to Contractor.

The Contractor shall provide the ~~Owner~~ Owner, Program Manager, their designated representative, and Architect with access to the Work in preparation and progress wherever located.

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§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, 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 (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, 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 indemnified hereunder. 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. **TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY DEFEND AND HOLD HARMLESS THE OWNER AND ITS TRUSTEES, OFFICERS, AGENTS, AND EMPLOYEES (COLLECTIVELY, THE "INDEMNIFIED PARTIES") FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE OR DEATH OF ANY EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR ITS SUBCONTRACTORS OF EVERY TIER, EVEN IF THE BODILY INJURY, SICKNESS, DISEASE OR DEATH IS CAUSED BY OR**

ALLEGED TO HAVE BEEN CAUSED BY THE NEGLIGENCE, FAULT OR STRICT LIABILITY OF ANY OF THE INDEMNIFIED PARTIES.

FOR ALL CLAIMS NOT ADDRESSED IN THE ABOVE PARAGRAPH, CONTRACTOR SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS THE OWNER AND ITS TRUSTEES, OFFICERS, AGENTS, AND EMPLOYEES AND (COLLECTIVELY, THE "INDEMNIFIED PARTIES"), FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, OF ANY NATURE WHATSOEVER ARISING OUT OF OR RELATED TO THIS AGREEMENT OR THE WORK TO BE PERFORMED UNDER THIS AGREEMENT, BUT ONLY TO THE EXTENT OF THE NEGLIGENCE OR OTHER FAULT OF THE CONTRACTOR, ITS AGENTS, REPRESENTATIVES, EMPLOYEES OR SUBCONTRACTORS OF ANY TIER.

§ 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 workers' compensation acts, disability benefit acts, or other employee benefit acts. It is understood and agreed that Subparagraph 3.18 above is subject to, and expressly limited by, the terms and conditions of TEX. CIV. PRACT. & REM. CODE ANN. 130.001-130.005 (Vernon Supp. 1989), as amended or modified, or any successor statute. Contractor shall **not** be obligated under Subparagraph 3.18 to indemnify or hold harmless Program Manager, Architect or any agent, servant of employee of Architect from liability or damage that is caused by or results from:

- .1** defects in plans, designs or specifications prepared, approved or used by the Architect; or
- .2** negligence of the Architect in the rendition or conduct of professional duties called for or arising out of the Contract Documents and the plans, designs or specifications that are a part of the Contract Documents; and arises from:
 - .1** personal injury or death;
 - .2** property injury; or
 - .3** any other expense that arises from personal injury, death or property injury.

§ 3.18.3 It is agreed with respect to any legal limitations, now or hereafter in effect and affecting the validity or enforceability of the indemnification obligation 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 obligation shall continue in full force and effect.

§ 3.19 Record Drawings

§ 3.19.1 Refer Owner's Closeout Procedures

§ 3.20 Prevailing Wage Rates

§ 3.20.1 As required by Chapter 2258 of the Texas Government Code Title 10 Prevailing Wage Rate, no employee used in this construction may be paid less than the minimum prevailing wage rate in effect for the Owner.

§ 3.20.2 The Contractor and each Subcontractor and Sub-subcontractor shall pay to all laborers, workmen, and mechanics employed in execution of this Contract not less than rates set forth by law for each craft of type of workman or mechanic needed to execute this Contract.

§ 3.20.3 Determination of prevailing wages shall not be construed to prohibit payment of more than the rates identified.

§ 3.21 Antitrust Violations

§ 3.21.1 Contractor hereby assigns to Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1 et.seq. (1973). The Contractor shall include this provision in his contracts with each Subcontractor and Supplier. Each Subcontractor shall include such provision in contracts with Sub-subcontractors and suppliers.

§ 3.22 Third-Party Beneficiary

§ 3.22.1 No person or entity shall be deemed to be a third-party beneficiary of any provision(s) of this Contract; nor

shall any provision(s) hereof be interpreted to create a right of action or otherwise permit anyone not a signatory party to the Contract to maintain an action for personal injury or property damage.

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§ 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 Contract Documents by the responsibilities, activities or duties of the Architect.

§ 4.2.1 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 Certificate for Payment. The Architect will have 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 representative 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..

§ 4.2.2 The Architect Architect, as a representative of the Owner, will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the work, and (3) to determine in general if the Work observed work is being performed in a manner indicating that the Work, work, when fully completed, will be in accordance with the Contract Documents. 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 will not have control over, charge of, or responsibility for documents. The Architect will be required to make on-site inspections as necessary to keep the Owner informed of the progress of the Work and as necessary to guard the Owner against defects and deficiencies in the Work. The Architect will neither have control over or charge of, no be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents. the Contract Documents, except as provided in Section 3.3.1. Further:

- .1 The Contractor expressly recognizes that the Architect does not owe him any duty to supervise or direct his work as to protect the Contractor from the consequences of his own acts or omissions.
- .2 Upon reasonable request by the Owner, the Contractor shall accompany the Owner and Architect on an observation tour(s) of the building and shall note any defects and start remedying these defects within ten (10) days of the observation tour. Contractor shall prosecute the Work without interruption until accepted by the Owner and the Architect.
- .3 Section 4.2.2, and the provisions of the Architect's Agreement with the Owner shall govern the number of site visits by the Architect. In this case, the Owner and Architect may agree in writing on an alternative site visit schedule that is appropriate for this particular project.
- .4 If during the Architect's site visits the Architect observes any deviation from requirements of the Contract Documents, the Architect (or designee) shall report within three (3) business days to the Owner any such deviation. A copy of said report shall be sent to the Contractor. Failure to observe or report any deviation shall not be a waiver to subsequently require correction of the same, similar or other deviations.

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§ 4.2.6 The Architect has shall have authority to reject Work that does not conform to the Contract Documents. The Architect shall be required to promptly notify the Owner of any non-conforming Work and shall reject such non-conforming Work unless the Owner objects to the rejection in writing within twenty-four (24) hours of such notification. Whenever the Architect considers it necessary or advisable, advisable for implementation of the intent of the Contract documents, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the the provisions of the Contract Documents, whether or not such Work is fabricated, installed or completed. Performance of any additional inspection or testing, which would result in additional cost to the Owner, shall require advance notice to and approval of the Owner. 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 to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.
the Work, except when the Contractor's inability to perform the Work is a result of design flaw, error or omission.

...

§ 4.2.8.1 Allowance Expenditure will be authorized using Allowance Expenditure authorizations (AEA) executed by the Owner, the Architect and the Contractor. All Allowance Expenditure Authorizations will be incorporated into the contract by Change Order at the completion of the project. Work authorized by an AEA may be invoiced as it is completed.

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§ 4.2.13 ~~The Architect's~~ All decisions on matters relating to aesthetic effect ~~will be final if consistent with the intent expressed in the Contract Documents.~~ shall initially be made by the Architect; however, all such decisions are subject to the Owner's written approval.

...

§ 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. Wherever relevant, the term "Subcontractor" shall also include a person, or entity who supplies material or equipment for the Project.

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§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution. Prior to such change the Contractor shall notify the Architect of his intent and reasons for such proposed change.
§ 5.2.5 The Contractor shall submit the list of proposed Subcontractors on AIA Document G805. The Contractor may obtain blank copies from the Architect.

§ 5.2.6 Contractor shall promptly notify the Owner, Architect and Program Manager of any material defaults by any subcontractor.

...

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the ~~subcontract~~ subcontract, but only to the extent permitted by law.

...

§ 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 assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.~~

...

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate ~~agreements.~~ 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.~~ other 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 may perform other Work with separate Contractors or forces. Owner shall have access to the building on the site at all times..

...

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, 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. 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 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.

§ 6.1.3 The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the other 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's and Owner's separate contractor's work, including required monitoring, testing and inspections by independent firms, with the Work under this Agreement. 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 contain 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.

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§ 7.1.1.1 No change 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.

§ 7.1.1.2 Contingency Allowance Expenditure Authorization. A change in the work that does not require a change in Contract Sum or Contract Time may be paid from a designated Project Allowance. A Contingency Allowance Expenditure Authorization (CAEA) is a written order prepared by the Architect and signed by the Architect, Owner, Contractor and Program Manager directing a change in the Work.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect, on agreement among the Owner's Board of Trustees, Contractor, and Architect, except when the Contract balance is amended as a result of Owner's Right to Carry out the Work under Section 2.4, or the Owner's assessment of liquidated damages as allowed by the Contract Documents. In such event, the Change Order is deemed approved by Contractor, and Contractor's signature(s) are not required. A Construction Change Directive requires agreement by the Owner and Architect-Owner, or the Owner's representative, and Architect, and may or may not be agreed to by the Contractor. An Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 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.

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§ 7.2.2 Methods used in determining adjustments to the Contract Sum shall be determined in one or more of the ways

listed below. The first method listed shall be used unless the Architect determines that the method is inappropriate, in which case another method shall be selected:

- .1 By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation. Where additional Work is involved, any lump sum over the amount of \$10,000.00 shall be broken down to represent the estimated cost of labor and materials plus mark-ups to cover overhead and profit.
 - .1 To compensate the Contractor, Subcontractor, or Sub-subcontractor actually performing a part of the Work for the combined cost of overhead and profit, the performing party shall be entitled to a single mark-up not to exceed 10% of the estimated cost of that part of the Work.
 - .2 To compensate (a) the Contractor for the combined cost of overhead and profit on Work performed by Subcontractors, or (b) Subcontractors for the combined cost of overhead and profit on Work performed by Sub-subcontractors, the Contractor or Subcontractor shall be entitled to a single mark-up not to exceed 5% of the subcontract amount.
 - .3 When a Sub-subcontractor performs the Work of a change, the maximum mark-up not to exceed 10% for combined overhead and profit shall be used only by the Sub-subcontractor. The Contractor and Subcontractor would each be entitled to a single mark-up not to exceed 5% of the cost to them for the Subcontractor and Sub-subcontractor, respectively.
- .2 By Unit Prices stated in the Contract Documents or subsequently agreed upon. Additional mark-ups for overhead and profit will not be allowed in Unit Price work.
- .3 By cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee.
- .4 Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.2.2 shall be limited to the costs established in Sections 7.3.7.1 through 7.3.7.5.

§ 7.2.3 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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§ 7.3.3 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;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon; § 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the methods described in Section 7.2.2 or as provided in Section 7.3.4.
- .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.

...

- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; directly related to the change and required by Contract Documents (unless the change is charged to an allowance already included in the Contract Sum, in which case additional mark-ups for these items will not be allowed; and

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§ 7.5 Allowable Markups for Changes in the Work

§ 7.5.1 Unless otherwise directed, the procedure and markup of the costs for additional work shall be determined in the following manner:

- .1** Upon Change Proposal request, the Contractor shall quote the cost for changes in the work showing separately, credits and additional costs broken down by headings used in the Schedule of Values. Further breakdown into units of labor and materials may be required if agreement on cost cannot be reached using the breakdown by headings. The final cost shall be the amount of the Total Contract Value Change shown on the Change Proposal signed by the Contractor and Owner. For general construction work, not subcontracted, the Contractor shall consider as costs the actual invoice amount for additional materials, the sales tax on additional materials when applicable, the wages paid for additional direct labor, plus the Contractor's usual markup of wages to cover additional labor related costs such as insurance, taxes and fringe benefits.
- .2** On changes executed within the Owner's Contingency Allowance, Contractor shall have included costs for combined overhead and profit, to the extent permitted by the Contract Documents, and General Conditions costs, including the cost of superintendents, field office expense, temporary facilities and services, small hand tools, construction equipment not specifically provided for the change in hand, home office expense, bond and building insurance premiums, and managing the Subcontractor's work, in his Base Contract amount. Allowed overhead and profit fee on Owner's Contingency Allowance changes to be included in the total cost to the Owner shall be based as follows:
 - .1** For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, ten percent (10%) of the cost.
 - .2** For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractors.

§ 7.5.2 If any additional Work is authorized outside of or in excess of the Owner's Contingency Allowance, the combined overhead and profit for this work shall be based as follows:

- .1** For the Contractor, for Work performed by the Contractor's own forces, a maximum total markup of ten percent (10%) of the actual cost on a lump sum project, or the Contractor's Construction Phase Fee on a Guaranteed Maximum Price Project.
- .2** For Work performed by the Contractor's Subcontractor(s), five percent (5%) of the amount due the Subcontractor(s).
- .3** For each Subcontractor or Sub-subcontractor involved, for work performed by that Subcontractor's or Sub-subcontractor's own forces, a maximum markup of ten percent (10%) of the actual cost.
- .4** For each Subcontractor, for work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor.
- .5** Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7.

§ 7.5.3 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 and detailed 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. In no case will a change be approved without such itemization.

§ 7.5.4 Change orders, as they are accepted by the Owner, shall be entered under heading "Change Orders" in the next current Request for Payment.

§ 7.5.5 All credits to or deductions from the Contract Sum, a Contingency or an Allowance shall be calculated using the same methodology set forth in this Section 7.5. All unused Contingency or Allowance amounts shall be credited back to Owner prior to final payment, along with any markups included in the Contract Sum or GMP on such unused amounts.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined. See further definition of "Day" in Section 1.9.10. § 8.2 Progress and Completion

§ 8.2 Progress and Completion

...

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, or of an employee of either, or of a ~~Separate Contractor~~; (2) ~~separate contractor employed by the Owner~~, or by changes ordered in the Work; (3) ~~Work~~, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, casualties or other unforeseeable causes beyond the Contractor's control, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine. **No extensions of the Contract Time will be granted for inclement weather, except for Force Majeure events consisting of named storms or government declared emergencies resulting from extreme weather.**

...

§ 8.3.4 The parties hereto agree that time is of the essence of this Contract and that pecuniary damages would be suffered by the Owner if the Contractor does not substantially complete all Work called for in the Contract Document by the specified date, which damages are, by their very nature, difficult of ascertainment. It is therefore expressly agreed, as a part of the consideration inducing the Owner to execute this Contract that the Owner may deduct from the final payment made to the Contractor a sum equal to the amount stated in the Contract Documents, per phase for each and every Calendar Day beyond the agreed date which the contractor has agreed to for Substantial Completion of the Work included in the Contract Documents. It is expressly understood that 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 substantially completed within the agreed time, or with the legally 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 or forfeiture; said damage being caused by additional compensation to personnel, and other miscellaneous increased costs, all of which are difficult of exact ascertainment. The liquidated damages assessed herein shall be Owner's sole remedy for time delays between the deadline for substantial completion and Contractor's achievement of substantial completion.

§ 8.3.5 Failure to complete and close-out the Project, and complete all Punch List items, within sixty (60) days after the scheduled Substantial completion date will additionally entitle the Owner to deduct from the final payment made to the Contractor a sum equal to the amount stated in the Contract Documents, per phase, for each and every Calendar Day beyond the 60-day close-out period. It is expressly understood that 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 Project close-out does not occur on a timely basis. Said sum shall be considered as liquidated damages only and in no sense shall be considered a penalty or forfeiture; said damage being caused by additional compensation to personnel, and other miscellaneous increased costs, all of which are difficult of exact ascertainment. If the Contractor is delayed through no fault of the Owner, the Substantial Completion is not achieved by the agreed contract completion date, the Project close-out period of sixty (60) days will not be extended by the number of days of delay past the actual Substantial completion date and will remain based upon the agreed contract completion date.

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§ 9.1.1.1 The Owner is exempt from payment of Texas State Sales Tax on materials required for the Work. Therefore, to comply with the law, the Contract Sum shall be broken down into the amount of cost for labor and the amount of cost for materials. This breakdown shall be provided by the Contractor within ten (10) days of award of Contract.

...

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum 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 may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment. § 9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect and Program Manager a schedule of values fairly allocating the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as reasonably required by the Architect and Program Manager, and updated for changes in the Work, the schedule of values shall be used only as a basis for reviewing the Contractor's Applications for Payment and is not to be taken as evidence of market or other value. The schedule shall not overvalue early job activities. Each item shall include a pro-rata portion of overhead and profit. The schedule shall follow the divisions of the Specifications so far as practicable and shall contain line items for equipment and system start up and testing.

§ 9.2.1 General Contractor's cost for Contractor's fee, bonds and insurance, General Conditions, etc., shall be listed as individual line items.

§ 9.2.2 Schedule of Values shall break each line into materials and labor. Once approved by the Owner and Architect, it shall be used as basis for reviewing Application for Payment but not be taken as evidence of market or other value.

§ 9.2.3 Contractor's cost for various construction items shall be detailed. For example, concrete work shall be subdivided into footings, grade beams, floor slabs, paving, etc. These subdivisions shall appear as individual line items.

§ 9.2.4 On major subcontracts, such as mechanical, electrical, and plumbing, the Schedule shall indicated line items and amounts in detail, (for example; underground, major equipment, fixtures, installation of fixtures, start up, etc.)

§ 9.2.5 Costs for subcontract work shall be listed without any addition of General Contractor's costs for overhead, profit or supervision.

§ 9.2.6 The Contractor shall include a value for the coordination documents/drawings on the schedule of values.

§ 9.2.7 The Contractor shall include a value for the correction of deficiencies noted by the Commissioning Agent and the Test, Adjust and Balance consultant on the schedule of values for each sub-contractor subject to commissioning and test, adjust and balance requirements.

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§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment 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. No later than 3 working days prior to the first Wednesday of each month, submit an itemized Application for Payment, supported by such data sustaining the Contractor's right to payment as the Owner or Architect may require, and reflecting retainage, as provided elsewhere in the Construction Documents. Information on the form shall be divided into the same last day of the month preceding, which shall also be the basis of payment or as agreed by the Owner, Contractor and Architect by verification at the site, prior to submittal.

§ 9.3.1.1 As provided in Section 7.3.9, Section 7.3.9, such applications may include requests for payment on account of changes in the Work that which have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, Directives 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 not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay. Contractor agrees, for purposes of Texas Government Code 2251.042, receipt of the

Certified Applications for Payment from the Architect shall not be construed as receipt of an invoice by the Owner. Contractor further agrees that Program Manager's receipt of the Certificate of Payment shall be construed as receipt of an invoice by the Owner, for purposes of Texas Government Code Section 2251.042

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall Payments will be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and or equipment 1) incorporated in the Work; 2) suitably stored at the site; or 3) suitably stored at some off-site location, provided the following conditions are met for off-site storage:

- .1 The location must be agreed to, in writing, by the Owner and Surety.
- .2 The location must be a bonded warehouse.
- .3 Surety must agree, in writing, to each request for payment.
- .4 The Contractor must bear the cost of the Owner's and Architect's expenses related to visiting the offsite storage area for confirmation.

Payments for materials or equipment stored on or off the site shall be conditioned upon compliance by the Contractor with submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials and or equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such including applicable insurance (naming the Owner as insured) and transportation to the site for those materials and equipment stored off the site. Under no circumstances will the Owner reimburse the Contractor for down payments, deposits, or other advance payments for materials or equipment.

The Contractor acknowledges that the review of materials and/or equipment stored off the side is an additional service of the Architect, and the Contractor shall be charged for that service. The cost for such service will be established by the Architect and is not subject to appeal.

...

§ 9.3.4 The Contractor shall submit requests for payment in duplicate, using AIA Document G702, Application and Certificate of Payment, as the cover sheet. Continuation sheets showing in detail the amounts requested, etc., shall be submitted using AIA Document G703, Continuation Sheet, or a computerized version of these documents previously approved for use. The information provided on the continuation sheets in the Description of the Work and Scheduled Values columns shall match the corresponding information shown on the approved Schedule of Values. All blank spaces on AIA Document G702, Application and Certificate of Payment, must be completed and the signatures of the Contractor and Notary Public shall be original on each form. By submitting his application for payment, the Contractor certifies that the individual signing the application is authorized to do so.

§ 9.3.5 The Contractor shall submit the Fort Bend ISD Subcontractor Progress Assessment Form with each application for payment requesting payment be made for Work performed by a subcontractor that qualifies as a "small business" pursuant to FBISD Board Policy CV (Local). The Contractor shall also ensure that, once Contractor makes the applicable payment to the Small Business Subcontractor, the Subcontractor completes the Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form in its entirety and Contractor agrees to submit the completed copies to Owner with the next application for payment. The completed Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form must be received by the Owner before any further payment will be made to Contractor for any Work performed.

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§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect and Program Manager to the Owner, based on the Architect's and Program Manager's evaluation of the Work and the data in the Application for Payment, comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the and Program Manager's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, completion and to specific qualifications expressed by the Architect.

~~However, the Architect and Program Manager. 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; Work, (2) reviewed construction means, methods, techniques, sequences, or procedures; sequences or procedures, (3) reviewed copies of requisitions received from the Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; 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.~~

...

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 Architect or Program Manager's~~ opinion the representations to the Owner required by ~~Section 9.4.2 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. 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 ~~or Program Manager~~ is able to make such representations to the Owner. The Architect ~~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 necessary~~, in the Architect's ~~opinion 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 Section 3.3.2, because of:~~

- ~~.1 defective 1.~~ Defective Work not remedied;
- ~~.2 third 2.~~ Third party claims ~~filed filed~~ or reasonable evidence indicating probable filing of such ~~claims, claims~~ unless security acceptable to the Owner is provided by the Contractor;
- ~~.3 failure 3.~~ Failure of the Contractor to make payments properly to Subcontractors or ~~suppliers for~~ labor, materials or equipment;
- ~~.4 reasonable 4.~~ Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- ~~.5 damage 5.~~ Damage to the Owner or ~~a Separate Contractor; another contractor;~~
- ~~.6 reasonable 6.~~ Reasonable evidence that the Work will not be completed within the Contract ~~Time, Time~~ and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; ~~or~~
- ~~.7 repeated 7.~~ Persistent failure to carry out the Work in accordance with ~~the Contract Documents. 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

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§ 9.5.5 If the work has not attained Substantial Completion by the date agreed upon and set forth in the Amendments, subject to extensions of time as described in the Contract Documents, Owner may, in sole discretion, direct Architect or Program Manager to withhold payment to Contractor to the extent necessary to reserve sufficient funds to complete the construction of the Project and to cover liquidated damages assessed against Contractor up to the time of the Application for Payment and to the time it is reasonably anticipated Substantial Completion will be achieved. The Owner shall not be deemed in default by reason of withholding payment as provided for in Sections 9.3.4, 9.4.3, 9.5.1, or this Section.

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make ~~payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect progress payments in~~ accordance with the following Section which shall be inserted as Article 5, Progress Payments, in the Owner-Contractor Agreement, AIA Document A101, 2017 Edition.

- .1 Based upon the applications for payment and supporting documents submitted to the Architect by the Contractor and certification of the amount payable by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in the Contract Documents for the period ending the last day of the month as follows:
- .2 Not later than twenty (20) working days following the first Wednesday of each month, ninety-five percent (95%) of the portion of the Contract Sum properly allocable to labor, materials, and equipment incorporated in the Work and ninety-five percent (95%) of the portion of the Contract Sum properly

allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing, for the period covered by the Application for Payment, less the aggregate of previous payments made by the Owner. Applications for Payment shall be submitted by the first Wednesday of the month.

.3 Upon Substantial Completion of the entire Work, a sum sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect shall determine for all incomplete Work and unsettled claims as provided in the Contract Documents.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven 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. More specifically, if only five percent (5%) retainage is withheld by the Owner on payments to the Contractor, then the Contractor shall withhold only five percent (5%) retainage on payments to subcontractors; and subcontractors shall withhold only five percent (5%) retainage on payments to sub-subcontractors. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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§ 9.6.9 Within seven (7) calendar days of receipt of payment from the Owner, the Contractor shall pay each subcontractor, out of the amount of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payment to the Contractor on account of such 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. Owner is not obligated to monitor payments to Subcontractors or Sub-subcontractors, and nothing in this section shall create any right on the part of a Subcontractors or Sub-subcontractor against Owner, Architect or Program Manager. 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's failure to make payments within such time shall constitute a material breach of this Contract. Contractor shall include a provision in each of its Subcontractor's imposing the same payment obligations on its Subcontractors as are applicable to the Contractor hereunder, and if the Owner so requests, shall provide copies of such Subcontractor payments to the Owner. If the Contractor has failed to make payment 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.

§ 9.6.10 Contractor shall not withhold as retainage a greater percentage on Subcontractors or material men than the percentage Owner withheld as retainage from payments to the Contractor.

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within ~~seven~~ ten days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within ~~seven~~ ten days after the date established in the Contract Documents, the amount certified by the Architect ~~or awarded by binding dispute resolution,~~ then the Contractor may, upon seven additional days' notice to the Owner and Architect, 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.

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§ 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 Contractor shall prepare and submit to the Architect 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. In order to initiate and facilitate the preparation of the Contractor's list of items to be completed or corrected (Punch List), the Architect and Program Manager, if requested by the Contractor, will inspect a few representative rooms with the Contractor's superintendent and the office project manager to assist the Contractor in the preparation of the Contractor's Punch List. The Contractor's superintendent shall participate in the preparation of the Contractor's Punch List that is submitted to the Architect and shall personally inspect each and every item himself before certifying to the Architect that listed items have been corrected. Should the Architect determine that the Contractor's Punch List lacks sufficient detail or requires extensive supplementation, the Punch List will be returned to the Contractor for revision and the inspection for determining the Date of Substantial Completion will be delayed until the Punch List submitted is a reasonable representation of the work to be completed. To further facilitate completion of the Work the

Contractor's superintendent shall accompany the Architect and his consultants during their inspections and the preparation of their supplements to the Punch List and the superintendent shall record or otherwise take note of those supplementary items. The Architect will endeavor to furnish to the Contractor typed, hand-lettered, written or recorded supplements to the Punch List in a prompt manner; however, any delay in the Contractor's receiving said supplements from the Architect shall not be cause for a claim for additional cost or extension of time as the Contractor's superintendent shall have been in attendance during the inspections of the Architect and his consultants and will have been expected to taken his own notes. Furthermore, a significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judges of what constitutes a significantly large number of items.

...

§ 9.8.6 In order for the project or a major portion thereof to be considered substantially complete, the following conditions must be met:

- .1 All inspections by governmental authorities having jurisdiction over the project must have been finalized, any remedial work required by those authorities must have been completed, and Certificates of Occupancy and similar governmental approval forms must have been issued and copies delivered to the Owner and Architect.
- .2 All work, both interior and exterior, shall have been completed and cleaned except minor items which if completed after occupancy, will not, in the Owner's opinion, cause interference to the Owner's use of the building or any portion thereof. A significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judge of what constitutes a significantly large number of items.

The following items are a partial specific list of requirements, as applicable to the Project, that must be completed **prior** to established Substantial Completion of all portions of the work (Including the Substantial Completion of the commissioning phase).

1. All fire alarm system components must be completed and demonstrated to the Owner.
2. Local fire marshal approval certificate, or similar Certificate of Occupancy from the governing agency, must be delivered to the Owner.
3. All exterior clean-up and landscaping must be complete.
4. All final interior clean-up must be complete.
5. All HVAC air and water balancing must be complete.
6. All required commissioning must be complete.
7. All Energy Management Systems must be complete and fully operational and demonstrated to the Owner.
8. All communications equipment, telephone system, and P.A. systems must be complete and demonstrated to the Owner.
9. All final lockset cores must be installed and all final Owner directed keying completed.
10. All room plaques and exterior signage must be completed.
11. All Owner demonstrations must be completed including kitchen equipment, HVAC equipment, plumbing equipment, and electrical equipment.
12. A final certificate of occupancy must be signed by the Contractor and delivered to the Owner.

§ 9.8.7 After the date of Substantial Completion of the Project, as evidenced by the Certificate of Substantial Completion, G704 current edition, the Contractor will be allowed a period of thirty (30) days (unless extended by mutual agreement or provision of the Contract) within which to correct all deficiencies attached to the Certificate of Substantial Completion. Failure of the Contractor to complete such corrections within the stipulated time will be reported to the Contractor's Surety. In the report of deficiency, the Contractor and Surety will be informed that, should correction remain incomplete for fifteen (15) additional days, the Owner may initiate action to complete corrective work out of the remaining Contract funds in accordance with Section 14.2. Additional costs of the Owner, Architect, and other consultants incurred because of the Contractor's failure to complete the correction of deficiencies within thirty (30) days after the date of Substantial Completion (unless extended by mutual agreement or provision of the Contract) may be deducted from the funds remaining to be paid to the Contractor. Should corrective work following Substantial Completion require more than one reinspection after notification by the Contractor that corrections are complete, the cost of subsequent inspections may also be deducted from funds remaining unpaid to the Contractor.

§ 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 inspection and, when the Architect and the Program Manager finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and Contractor fully performed, the Architect and the Program Manager will promptly prepare, sign and issue a Certificate of Final Completion and a final Certificate for Payment certifying to the Owner that, 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 terms and conditions of 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's 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.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and 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 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) 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, other data establishing payment or satisfaction of obligations, such as 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. Prior to final payment, the Contractor shall meet all of the requirements of Owner's Closeout Procedures. **§ 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 it shall not constitute a waiver of Claims.

§ 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 it shall not constitute a waiver of Claims.

§ 9.10.6 Final Payment, constituting the entire unpaid balance of the Contract Sum, shall be paid by the Owner to the Contractor thirty-one (31) days after Substantial Completion of the Work unless otherwise stipulated in the Certificate of Substantial Completion, provided the Work has then been completed, the Contract fully performed, all Contract Close Out Documents have been submitted, and the Final Certificate for Payment has been issued by the Architect.

The final payment will not be made until all of these conditions have been satisfied. **§ 9.10.7** 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 the 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 assume the responsibility for any damages to the Work caused by such occupancy.

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§ 10.1.1 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 Contractor 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 USC Section 651 et seq., and all amendments thereto. However, the Contractor's duties herein shall not relieve any Subcontractor and 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.

§ 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 controlled substance, or use, posses, distribute, or sell alcoholic beverages while on Owner's premises. No person shall use, possess, distribute, or sell illicit or unprescribed controlled drugs or drug paraphernalia; misuse legitimate prescription drugs; or act in contravention of warnings on medications while performing the Work or on Owner's premises.

§ 10.1.3 Contractor has implemented it's own Safety Manual 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 accident 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 alcohol or drug test.

§ 10.1.4 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). Owner has also banned the presence of all weapons on the Project site, whether or not the owner thereof has a permit for a concealed weapon, and the Contractor agrees that the Contractor's representative, employees, agents, and sub-contractors will abide by the same.

...

§ 10.2.3 The Contractor shall ~~implement, erect, erect~~ and maintain, as required by existing conditions and performance of the Contract, reasonable ~~safeguards~~ safeguards, for safety and protection, including posting danger signs and other warnings against ~~hazards~~; ~~hazards~~, promulgating safety ~~regulations~~; regulations and notifying the owners and users of adjacent sites and ~~utilities of the safeguards~~ and utilities. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property adjacent to the Project and improvements therein. Any damage to such property for improvements shall be promptly repaired by the Contractor. Contractor shall provide reasonable fall protection safeguards and provide approved fall protection safety equipment for use by all exposed Contractor employees.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, 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.~~ 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 explosives materials on Owner's property is prohibited unless expressly approved in advance by authorities having jurisdiction and 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.

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§ 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 which meets or exceeds the minimum requirements set forth in the provisions of the FBISD Safety Plan. 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. Seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto, and to enforce and comply with all 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 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.

...

§ 10.2.9 The performance of the foregoing services by the Contractor shall not relieve the Subcontractors of their responsibilities for the safety of persons and property and for compliance with all applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to the conduct of the Work.

§ 10.2.10 The Contractor shall be responsible for taking all precautions necessary to protect the Work in place from any foreseeable weather conditions which could cause any potential damage to portions or all Work in place. The Contractor shall be responsible for performing all repairs and/or replacement of any Work that results from foreseeable weather conditions.

§ 10.2.11 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 cause death, personal injury, or property damage, giving full details and statement of any witness. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner, Program Manager and the Architect.

§ 10.2.12 The Contractor shall be responsible for the protection and security of the Work until it receives written notification that the Substantial Completion of the Work has been accepted by the Owner.

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. materials. 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), substance encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition. report the condition to the Owner and Architect in writing. The Owner, Contractor and Architect shall then proceed in the same manner described in Section 10.3.2.

§ 10.3.1.1 Owner and Contractor may enter into a separate agreement and/or Change Order for Contractor to remediate and/or render harmless the Hazardous Substance, but Contractor shall not be required to remediate and/or render harmless the Hazardous Substance absent such agreement. Contractor shall not be required to resume work in any area affected by the Hazardous Substance until such time as the Hazardous Substance has been remediated and/or rendered harmless.

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§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from 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 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.

§ 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 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 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.

§ 10.3.7 As part of the construction contract close out process, and prior to receiving payment of any of the retainage, the Contractor and his subcontractors shall submit notarized statements pertaining to the above referenced hazardous materials.

...

The Owner reserves the right to review the insurance requirements during the effective period of any Contract to make reasonable adjustments to insurance coverages and limits when deemed reasonably prudent by Owner based upon changes in statutory laws, court decisions or potential increase in expense to loss.

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor 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. 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.

§ 11.1.2 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.

§ 11.1.3 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.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of 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 notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2 ~~§ 11.2.1~~ The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner 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. ~~§ 11.2.1 § 11.2.2 § 11.2.3 § 11.2.4 § 11.2.5 § 11.2.6 intentionally deleted.~~

Please refer to Exhibit A to AIA Document A133-2009, Insurance and Bond Requirements.

§ 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.

§ 11.2.3 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.

§ 11.3 The Owner requires that the following insurance requirements be satisfied:

- .1 No Work shall be commenced until all insurance requirements set forth in this Agreement have been approved by the Owner in writing.
- .2 All insurance policies and certificates required hereunder shall be in form and content satisfactory to the Owner.
- .3 The Owner shall be furnished an ACORD form Certificate of Insurance evidencing all policies and endorsements required by this Agreement prior to execution of the Contract and thereafter upon renewal or replacement of each required policy of insurance.
- .4 Each Insurance coverage/policy shall contain a provision that at least thirty (30) days prior written notice shall be given to the Owner in the event of cancellation, material change, or non-renewal.
- .5 Insurance shall be underwritten by a company licensed to do business in Texas, satisfactory to Owner and rated minimum A-VII by A.M. Best.
- .6 The insurance coverages specified herein shall be maintained at all times during the term of the contract and, with the exception of builder's risk coverage, shall be maintained for a minimum of one (1) year thereafter.
- .7 No deletions/exclusions from the standard coverage form are allowed without the prior written consent of the Owner.
- .8 All insurance except Professional Liability must be issued on an occurrence basis.
- .9 The Contractor shall be responsible for all deductibles; the Owner shall approve the deductibles selected.
- .10 With the exception of Excess Umbrella Coverage, the coverage afforded by each carrier must be a primary over any other applicable insurance.
- .11 In addition to certificates of insurance, copies of policy endorsements must be provided (a) listing the Owner as Additional Insures, and (b) showing waivers of subrogation in favor of the Owner.

§ 11.4 Performance Bond and Payment Bond

§ 11.4.1 The Contractor shall provide a Performance Bond, in the penal sum equal to one hundred percent (100%) of the Contract Sum, if the formal Contract is in excess of One Hundred Thousand Dollars (\$100,000.00) and a Labor and Material Payment bond, in the penal sum equal to one hundred percent (100%) of the Contract sum if the formal contract is in excess of Twenty Five Thousand Dollars (\$25,000.00).

§ 11.4.2 The Work will not be started until the bonds and issuing companies have been accepted as satisfactory by the Owner. The original bonds will be delivered to the Owner with an attached authorized power of attorney. Such Bonds shall be issued by a company authorized to do business in the State of Texas with an A.M. Best Company rating of at least A-X and included on the U.S. Department of the Treasury Listing of Approved Sureties (Dept. Circular 570).

§ 11.4.3 The Performance Bond Form and the Payment Bond Form included herein shall be executed and submitted to the Architect in duplicate prior to commencement of the work. The surety companies must be acceptable to the Owner and licensed admitted carriers in the State of Texas; and the companies must appear in a current Federal Treasury list as Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring companies.

§ 11.4.4 Each bond shall be of penal sum equal to one hundred percent (100%) of the Contract Sum and shall be compatible with the provisions of the governing authority. The Contractor shall file copies of each bond with the county clerk and furnish the Owner with a file receipt. The bonds shall remain in force throughout the warranty period of the contract. The Work will not be started until the bonds and issuing companies have been accepted as satisfactory by the Owner. The original bonds will be delivered to the Owner with an authorized power of attorney attached.

§ 11.4.5 Claims must be sent to the Contractor and his Surety in accordance with Article 5160, Revised Civil Statutes. The Owner will furnish in accordance with such Article, a copy of the Payment Bond as provided therein to claimants upon request. All claimants are cautioned that no lien exists on the funds unpaid to the contractor on such Contract, and that reliance on notices sent to the Owner may result in loss of their rights against the Contractor and/or his Surety. The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no responsibility because of any representation by any agent or employee.

§ 11.5 Worker's Compensation Insurance

§ 11.5.1 Comply with the requirements of Rule 28, TAC §110.110, Reporting Requirements for Building or

§ 11.5.2 Definitions:

- .1 Certificate of coverage ("certificate"). 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-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing service as on a project, for the duration of the project.
- .2 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 has been completed and accepted by the governmental entity.
- .3 Persons providing services on the project ("subcontractor" in §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 has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity which furnishes persons to provide services on the project. "Services" include without limitation, providing hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply delivery, and delivery of portable toilets.

§ 11.5.3 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, Section 401.011(44) for all employees of the Contractor providing services on the project, for the duration of the project.

§ 11.5.4 The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

§ 11.5.5 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 governmental entity showing that coverage has been extended.

§ 11.5.6 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 projects 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 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.

§ 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.

11.5.7 The Contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

§ 11.4 ~~Loss of Use, 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.~~

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement 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.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor 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 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.

§ 11.5.8 The Contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 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.

§ 11.5.9 The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Worker's Compensation, 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 coverage.

§ 11.5.10 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 meet the statutory requirements of Texas Labor code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project.
2. Provide 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 shown on the current certificate ends during the duration of the project.
4. Obtain from each other person with whom it contracts, and provides 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 one year thereafter.
6. Notify the governmental entity in writing by certified mail or personal delivery, within 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 these subsections (1)-(7), with the certificates of coverage to be provided to the person for whom they are providing services.

§ 11.5.11 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 actions.

§ 11.5.12 The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the governmental entity to declare the contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

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The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before 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 services and expenses made necessary thereby, shall be at the Contractor's expense. The Owner may make emergency repairs to the Work or take such other measures necessary under the circumstance, 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.

§ 12.2.1.1 In the event of failure of a specified project, either during construction or the correction period, the Contractor shall take appropriate measures with the manufacturer of the product to assure correction or replacement of the defective products.

§ 12.2.1.2 Refer to 01 77 00, Closeout Procedures in Division One for further terms regarding warranties which will be required prior to final payment.

§ 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 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 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 notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5. Approximately eleven months after substantial completion, the contractor shall accompany the Owner and Architect on an "end of the one year correction period" reinspection of the Project. Additional deficiencies observed or reported shall be corrected by the Contractor.

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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. § 12.3.1 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.

§ 12.3.2 The Owner's use and/or occupancy of any or all of the Project site shall never be construed as an acceptance of Work not in conformance with Contract Documents. The Owner reserves the right to enforce provisions of the Contract unless the Owner's acceptance is provided to the Contractor in writing.

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§ 13.7 Equal Opportunity

§ 13.7.1 The contractor shall maintain policies of employment as follows:

- .1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during

employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion 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 policies of non-discrimination.

§ 13.8 Criminal Background Checks

The Contractor/Subcontractor shall certify the Criminal Background Check, as stated in Fort Bend ISD Board Policy CJA and the form included herein, as required by Texas Education Code Section 22.0834 and Texas Administrative Code Section 153.1101 and 153.1117, and shall comply with all requirements of such laws and policy.

§ 13.9 Required Certifications

Contractor hereby certifies that it is not a company identified on the Texas Comptroller's list of companies known to have contracts with, or provide supplies or services to, a foreign organization designated as a Foreign Terrorist Organization by the U.S. Secretary of State under federal law. Contractor hereby certifies and verifies that neither Contractor, nor any affiliate, subsidiary, or parent company of Contractor, if any (the "Contractor Companies"), boycotts Israel, and contractor agrees that Contractor and Contractor Companies will not boycott Israel during the term of this Agreement. For purposes of this Agreement, the term "boycott" shall mean and include terminating business activities or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory.

Contractor verifies that: (1) it does not, and will not for the duration of the contract, boycott energy companies or (2) the verification required by Section 2274.002 of the Texas Government Code does not apply to the contract.

Contractor verifies that: (1) it does not, and will not for the duration of the contract, have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association or (2) the verification required by Section 2274.002 of the Texas Government Code does not apply to the contract.

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§ 14.2.5 The Contractor hereby assigns the Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1 et. Seq. (1973).

§ 14.2.6 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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§ 14.4.3 In the case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; 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. Contractor shall be entitled to receive payment for Work executed up to date of receipt of the notice of termination, plus costs of demobilization.

...

The Owner and Contractor shall commence all Claims 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 any case not more than 10 years after the date of 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.

...

§ 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 notice to the other party 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 either party ~~under this Section 15.1.3.1 shall must~~ be initiated within ~~21-ninety (90)~~ days after occurrence of the event giving rise to such Claim or within ~~21-ninety (90)~~ days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. 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.

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§ 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 had an adverse effect on the scheduled construction. **No extensions of the Contract Time will be granted for inclement weather, except as stated in Section 8.3.1.**

:

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .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.

§ 15.2.1 Claims, excluding those 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, arising under Sections 11.3.9 and 11.3.10, or claims alleging an error or omission by the Architect, shall be referred to the Initial Decision Maker for initial decision. The Architect 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 decision has not been rendered within 30 days after 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. If the parties are unable to agree, any claim, dispute or matters arising out of the contract between the Architect, Owner and Contractor or any combination of those parties shall be submitted to a court of appropriate jurisdiction.

...

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the ~~Initial-initial~~ Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons ~~therefor; therefore;~~ and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision 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 parties, but subject to mediation, if both parties so agree, and subject to legal or equitable~~

proceedings in a court having jurisdiction thereof. It is understood and agreed that, in the event that any dispute, controversy, or conflict arises during the design and construction of the Project or following its completion, the parties hereto will cooperate in good faith, if possible, to resolve the issues without resorting to litigation.

§ 15.2.6 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.

§ 15.2.8 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.

§ 15.2.9 The prevailing party in any judicial proceeding arising from the Contract Documents shall recover its reasonable and necessary attorneys' fees.

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor ~~may mutually agree~~ to resolve their Claims ~~claims~~ by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect. Request for mediation shall be filed in writing with the other party to the Contract. Mediation shall proceed in advance of legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, ~~filing~~ unless stayed for a longer period by agreement of the parties or court order. ~~If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

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§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 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.

~~§ 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.~~

ARTICLE 16 Contractor Accounts, Records, and Inspection

Contractor 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 shall make such 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 the respective agents. Job Records must be retained by Contractor for at least seven (7) years after the date of Final Completion of the Project. Furthermore, the Contractor shall promptly provide copies, including by electronic means, of all documents that may be required by the State Public Information Act.

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 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 Fort Bend 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 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.

~~§ 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.~~

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, _____, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 16:50:35 ET on 03/31/2022 under Order No. 2114291871 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 01 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

- 1. 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 FBISD Procurement Forms
- 2. Division 01 Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities
- 3. 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 FBISD Procurement Forms

1.4 SCOPE OF WORK. The Work consists of: Modifying exterior lighting at multiple campuses.

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 for the overall work performed under the contract. The daily work is required to have a qualified supervisor for the duration of the work. Any deviation from this will need to be approved by FBISD and the Owner's representative.

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 current CSI format for Renovation Work and for Addition Work, identifying the labor and material components separately.

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 FBISD.

1.8 PHASING. If 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. Phasing plans are guidelines and are used to identify a possible approach to the work. *The contractor may* submit a phasing plan for all scopes of work taking place when requested. Any deviation from the suggested plan contained in the contract documents must be approved by the A/E, owner or owner's representative, and Principal prior to implementation.

- A. Some work may need to be performed after normal school operating hours, nights and weekends. If an owner's representative is required outside normal hours of school operation, FBISD will incur overtime costs for FBISD staff presence at the school site, including weekends and holidays. Such overtime costs incurred may become the financial responsibility of the General Contractor and will be credited to the Owner. Determination of need for reimbursement will be made by FBISD and the owner's representative prior to the start of construction. FBISD and owner's representative reserve the right to alter the decision based on contractor performance.
- B. Refer to the School Operations Parameter Statement Section for details of the regular working hours, holidays and procedures for custodial overtime, etc.
- C. Work cannot start in a particular Phase until preceding phases on the campus are substantially complete.
 - 1. Close coordination with the A/E, Program Manager, and the School Staff, will be required of the Contractor.
- D. The Contractor shall allow sufficient time to accommodate the Abatement Contractor's work. This activity shall be shown as a separate activity on the Construction Schedule. General Contractor shall coordinate the abatement scheduling with FBISD's selected Environmental Consultant and the Owner Representative.

1.9 PHASING REQUIREMENTS

- A. All work must be scheduled to occur outside of school hours (no work to occur while classes are in session).
- B. A minimum of sixty-six percent of all faculty restrooms and a minimum of sixty-six percent of all student restrooms must remain in operation (with no construction activities on-going) during the school year (while classes are on-going).
 - 1. Each restroom that is renovated during the school year must be substantially complete to be included in the sixty-six percent of restrooms that are to remain in operation during the school year.
 - 2. Phasing for all scope of work is to be approved by the Owner for coordination with scopes of work by others that may be on going at each campus.
 - 3. Delivery of materials into restrooms under construction is not allowed to occur while classes are on-going. Exact delivery times available before and after classes are to be coordinated with the Owner.

1.10

1.11 HVAC AND WATER TREATMENT REQUIREMENTS Contractor will coordinate with FBISD for water treatment and HVAC maintenance. Please refer to the plumbing and mechanical specifications for the contractor's responsibilities related to these requirements.

1.12 PHASE ACCEPTANCE. Upon certification by the Contractor and recommendation of the A/E, FBISD 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 FBISD when the entire project has been completed; at that point, upon completion of all relevant contractual requirements, Architect 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, barring any deviations that have been pre-approved by owner's representative/FBISD. The contractor will install new filters and record date of replacement on each filter upon substantial completion.

1.13 USE OF TECHNOLOGY FOR PROJECT MANAGEMENT. FBISD will furnish information related to accessing web-enabled project management applications for this contract. FBISD and the owner's representative will implement project management software, Kahua, which will be easily accessible through the Internet. Contractor will cooperate with the owner's representative for the implementation and use of this tool.

Contractor will be required to create and post several types of documents into Kahua via the Internet. Request for Information (RFIs) will be posted by the Contractor and responded to by the A/E(s) in Kahua via the Internet, thereby facilitating communication among all parties and expediting resolution of issues. Any meeting minutes and field reports required to be created by the Contractor or A/E(s) will be posted to Kahua. FBISD and the Program Manager reserve the right to require additional documents to be entered into Kahua as shown below. Additional requirements may be identified.

Project Management Control System (PMCS) - Kahua

- The District and Owners Representative have agreed to use Kahua as the tool to manage projects between District, Owners Representative, and vendors (general contractors and architects).
- The following modules will be implemented:
 - Budget
 - Contracts
 - Invoices
 - Payments
 - Change Orders
 - Close Out
 - Issues
 - Meeting Minutes
 - Requests for Information

- Submittals
- Transmittals
- Field Details
- Field Work Directives
- Punch List
- Safety Notices

1.14 HAZARDOUS MATERIAL DESIGN AND CONSTRUCTION. FBISD has retained a separate environmental consultant to prepare contract documents including design drawings and specifications for the removal of hazardous materials from the schools and the air monitoring services (as applicable).

It shall be the responsibility of the Contractor to coordinate with the scheduled work performed by any of FBISD's separate Contractors including the hazardous materials abatement contractor. Contractor shall coordinate all aspects of the hazardous material abatement contractor's work with the Work under this Agreement. The Contractor shall always keep the Program Manager informed of all coordination issues with FBISD separate contractors. Other Contractor responsibilities in relation to the hazardous material design and construction coordination are per Article 6 of the General Contractor's Contract.

1.15 Permitting: Contractors are responsible for the costs of acquiring the building permits. The Contractor will obtain and pay for all trade permits and other miscellaneous permits that may be required by the City/County. Tap fees for connections to off-site water and sewer lines will be paid by unless specified differently by contract documents.

1.16 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.

1.17 Construction Specification Index: All construction documentation will follow the 2016 Construction Specification Index format.

1.18 The contractor shall tag locations of all equipment within the scope of work to comply with FBISD construction standards.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

3.1 USE OF PREMISES

- A. Contractor shall coordinate work of all trades with assistance by owner's representative for all subcontractors or consultants retained by FBISD.

- Contractor shall sequence, coordinate, and perform the Work to impose minimum hardship on the operation and use of the existing facilities and/or Project site. Contractor shall install all necessary protection for existing improvements, Project site, property, and new Work against dust, dirt, weather, damage, vandalism, and maintain and relocate all protection to accommodate progression of the Work.
- B. Contractor shall confine entrance and exiting to the Project site and/or facilities to routes approved by the Owner.
 - C. Contractor shall secure building entrances, exits, and Work areas with locking devices as required by the Owner.
 - D. Contractor assumes custody and control of Owner property, both; fixed and portable, remaining in existing facilities vacated during the work.
 - E. Contractor shall cover and protect surfaces of rooms and spaces in existing facilities turned over for the work, including Owner property remaining within as required to prevent soiling or damage from dust, dirt, water, and/or fumes. Contractor shall protect areas adjacent to the Work in a similar manner. Prior to Owner occupancy, Contractor shall clean all surfaces including OWNER property.
 - F. Within existing facilities, the Owner will remove or request the contractor to remove portable equipment, furniture, and supplies from work areas prior to the start of Work. CONTRACTOR shall cover and protect remaining items in areas of the Work.
 - G. Contractor is advised that school may be in session during performance of the work. Contractor shall utilize all available means to prevent generation of unnecessary noise and maintain noise levels to a minimum. When required by the Owner, Contractor shall immediately discontinue noise-generating activities and/or provide alternative methods to minimize noise generation. Contractor shall install and maintain air compressors, tractors, cranes, hoists, vehicles, and other internal combustion engine equipment with mufflers, including unloading cycle of compressors. Contractor shall discontinue operation of equipment producing objectionable noise as required by the Owner.
 - H. Contractor shall protect all surfaces, coverings, materials, and finished Work from damage. Mobile equipment shall be provided with pneumatic tires.
 - I. Contractor shall furnish, install, and maintain adequate supports, shoring, and bracing to preserve structural integrity and prevent collapse of existing improvements and/or Work modified and/or altered as part of the Work.
 - J. Contractor shall not use or allow anyone other than Owner employees to use facility equipment, except in an emergency.

End of Section

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PART 1 CERTIFICATION OF COMPLIANCE

1.1 REQUIREMENTS

- A. Work related to this section “Certification of Compliance” is in accordance with Texas Government Code (411.0845), Texas Administrative Code (153.1101), Texas Education Code (22.0834 & 44.034), and Board Policy (CJA).

1.2 CRIMINAL HISTORY IN GENERAL

- A. Before entering into a contract with the District, a person or business must give notice to the District if the person or an owner or operator of the business has been convicted of a felony. The District may terminate a contract with a person or business if the District determines that the person or business failed to give such notice or misrepresented the conduct resulting in the conviction.

PART 2 DEFINITIONS

- A. “Contracting entity” is an entity that contracts directly with the District to provide services to the District.
- B. “Subcontracting entity” is an entity that contracts with another entity that is not a district to provide services to a school district.
- C. “Direct contact with students” is the contact that results from activities that provide substantial opportunity for verbal or physical interaction with students that is not supervised by a certified educator or other professional District employee.
 - 1. Contact with students that results from services that do not provide substantial opportunity for unsupervised interaction with a student or students, such as addressing an assembly, officiating a sports contest, or judging an extracurricular event, is not, by itself, direct contact with students.
 - 2. However, direct contact with students does result from any activity that provides substantial opportunity for unsupervised contact with students, which might include, without limitation, the provision of coaching, tutoring, or other services to students.

PART 3 EMPLOYMENT / CONTRACT

- A. A person who, on or after January 1, 2008, is offered employment by an entity that contracts with the District or any subcontractor of the entity must submit to a national criminal history record information review if:
 - 1. The employee or applicant has or will have continuing duties related to the contracted services; and
 - 2. The employee or applicant has or will have direct contact with students.
- B. An entity contracting with the District and any subcontractor of the entity shall obtain all criminal history record information that relates to a person described above through the criminal history clearinghouse as provided by Government Code 411.0845.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 14 13 Certification of Compliance / Contractor Identification

-
- C. A contracting entity shall require that a subcontracting entity obtain all criminal history record information that relates to a person described above.

PART 4 CERTIFICATION TO DISTRICT

A. Contractor Certification

1. The entity and any subcontractor of the entity shall certify to the District that it received all of the criminal history record information required above. The entity and any subcontractor of the entity shall also certify that it will take reasonable steps to ensure that the conditions or precautions that have resulted in a determination that any person is not a covered contract employee continue to exist throughout the time that the contracted services are provided.

B. Sub-Contractor Certification

1. The subcontracting entity must certify to the District and the contracting entity that the subcontracting entity has obtained all criminal history record information that relates to an employee described above at EMPLOYMENT / CONTRACT, and has obtained similar written certifications from the subcontracting entity's sub-contractors.

C. Contractor and Sub-Contractor

1. The contracting entity and any subcontractor of the entity shall provide the District, at its request, the information necessary for the District to obtain criminal history record information for all covered contract employees.

D. COMPLIANCE WITH REQUIREMENT

1. The contracting entity complies with the requirements of this section if the contracting entity obtains a written statement from each sub-contracting entity certifying that the subcontracting entity has obtained the required criminal history record information for employees of the subcontracting entity and the subcontracting entity has obtained certification from each of the subcontracting entity's subcontractors.

E. DISQUALIFYING CONVICTION

1. The contracting entity shall not permit a covered contract employee to provide services at the District if the employee has a disqualifying conviction under Texas Education Code 22.085.

PART 5 CRIMINAL HISTORY RECORD INFORMATION

- 5.1 Each person as described above (PART 3), performing work on site under this contract (including Contractors, Project Managers and/or Job Foreman) is required to obtain a background check through the DPS criminal history clearinghouse.
- 5.2 The Contractor shall pay all associated processing fees for this history and clearance.
- 5.3 The Contractor shall, prior to commencement of any work at the site. Certify that the firm has obtained, reviewed and verified the criminal history for each person

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 14 13 Certification of Compliance / Contractor Identification

described above (PART 3).

- 5.4 The contractor shall, prior to commencement of any work at the site. Certify that no person described above (PART 3) have been convicted of any offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy.
- 5.5 In addition the contractor shall, obtain from each Sub contractor, prior to commencement of any work at the site. Certify that the firm has obtained, reviewed and verified the criminal history for each person described above (PART 3).
- 5.6 In addition the contractor shall, obtain from each Sub contractor, prior to commencement of any work at the site. Certify that no person described above (PART 3) have been convicted of any offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy.
- 5.7 The background checks shall remain confidential in a file located in the Contractors / Sub-Contractors possession.
- 5.8 The Contractor shall be advised that the background checks may take longer than a week to obtain from the Texas Department of Public Safety.

PART 6 ISSUANCE OF CLEARANCE IDENTIFICATION/ACCESS BADGES

- 6.1 Only after an individual criminal history has been obtained, reviewed and verified by the Contractor / Sub Contractor, a badge, hardhat emblem, or other visible identification identifier should be issued to the individual.
- 6.2 On request by the district, the Contractor / Sub Contractor must make available to law enforcement (District Police Department) a list off all persons that a criminal history has been obtained, reviewed and verified and that have been issued clearance identification/access badges for this project.

A. SUBMITTAL

1. Submit sample Identifier for project record.

6.3 RESPONSIBILITY

- A. All work and expenses required to obtain clearance identification/access badges or for other activities required in this section shall be borne by the Contractor as part of the Contract.

6.4 RULES AND REGULATIONS REGARDING IDENTIFICATION BADGES

1. Clearance identification/access badges provide access to the campus.
2. Any employee found on the campus without an -issued clearance identification/access badge will be escorted from the site and not be allowed to return until wearing a proper clearance identification/access badge.
3. All clearance identification/access badges are the property of the Contractor and must be immediately returned under the following conditions:
 - a. Upon expiration; Upon separation of employment (for any reason);
 - b. If convicted of, any disqualifying conviction under Texas Education Code 22.085

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 14 13 Certification of Compliance / Contractor Identification

-
- c. The Contractor shall immediately notify the District of personnel, Suppliers or Subcontractors whose work is terminated or completed and shall ensure badges are returned within 30 days of notification.

6.5 Escorting:

1. Any district staff, may escort any individual(s). THE ESCORT MUST REMAIN WITH THE INDIVIDUAL(S) BEING ESCORTED AT ALL TIMES WHILE ON THE SITE.
2. Escorts shall be limited to five (5) individuals, or less, depending on the circumstances to ensure positive control is maintained at all times.
3. A non-badged person can be escorted a maximum of five (5) times in a calendar year, starting the day of the first escort.

6.6 All badges that are lost, stolen, or otherwise unaccounted for must be immediately reported to the District.

6.7 Unsecured Doors: Contractors and their employees will be held accountable for doors located within their work sites that provide direct or indirect access to the campus. Doors that provide such access must NOT under ANY circumstances be left open and unattended. Individuals who have been issued Contractor badges are required to challenge any individual attempting unauthorized access to the campus.

6.8 Contractors requiring access through vehicle gates must make arrangements for access through the General Contractor/Campus.

PART 7 SPECIAL REQUIREMENTS

7.1 Each campus has specific access procedures which may include campus specific verification software and other visitor management requirements.

7.2 Coordinate and comply with each campus' requirements prior to start of work for their individual process.

PART 8 KEYS AND ACCESS CARD

8.1 Contractors that require keys and/or access card to perform work at the project site shall coordinate with the assigned FBISD Project Manager.

8.2 Keys should never be issued to Sub Contractors.

PART 9 FORMS (attached for your use)

9.1 Certification of Criminal History Record Information Review by Contractor

9.2 Certification of Criminal History Record Information Review by Sub-Contractor

End of Section 01 14 13

**CERTIFICATION OF CRIMINAL HISTORY RECORD INFORMATION REVIEW BY
CONTRACTOR**

Certifying Affidavit submitted to:

Name of School District: _____

Mailing Address: _____

Project/Agreement: _____

STATE OF TEXAS §

COUNTY OF _____ §

(1) The undersigned representative, on behalf of the contracting firm identified below, swears and affirms to _____ Independent School District (the "District") that such firm has obtained, reviewed and verified, from a law enforcement or criminal justice agency, the criminal history record information of all employees of the contracting firm hired *before January 1, 2008*, who (i) have or will have continuing duties related to the contracted services, and (ii) have or will have direct contact with students (substantial opportunity for verbal or physical interaction with students that is not supervised by a certified educator or other professional District employee). The undersigned further certifies that no employees of the contracting firm who meet the requirements of (i) and (ii) herein have been convicted of any offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy.

(2) The undersigned representative, on behalf of the contracting firm identified below, swears and affirms to the District, that such firm has obtained, reviewed and verified, from the Texas Department of Public Safety criminal clearinghouse, the national criminal history record information of all employees of the contracting firm hired *on or after January 1, 2008*, who (i) have or will have continuing duties related to the contracted services, and (ii) have or will have direct contact with students. The undersigned further certifies that no employees of the contracting firm, who meet the requirements of (i) and (ii) herein have been convicted of any offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy.

(3) The undersigned firm swears and covenants that no present or future employee of the contracting firm, no present or future independent contractor, and no present or future employee or independent contractor of any subcontractor of the contracting firm, will provide services to the Project on a continuing basis that involve direct contact with students unless and until such employee's or independent contractor's national criminal history record information has been reviewed, cleared and certified, as required herein. In the event of an emergency, an employee or independent contractor who has not been previously certified may only provide services that involve direct contact with students if such employee is escorted by a District employee.

(4) The undersigned firm swears and covenants that, upon receipt of information, directly or indirectly, that any employee or independent contractor of the contracting firm has been convicted of an offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy, the contracting firm will immediately remove or cause the removal of such employee from the Project or scope of the Agreement and notify the District.

_____, being duly sworn, affirms and certifies that he/she is the _____ (position) of _____ (contracting firm), and that all statements and acknowledgements contained herein are true and correct, and that he/she has the authority to bind such firm to the covenants set out above. _____

SUBSCRIBED AND SWORN TO BEFORE ME this ____ day of _____, 20____.

Notary Public _____ State of _____

My Commission expires _____

**CERTIFICATION OF CRIMINAL HISTORY RECORD INFORMATION REVIEW BY
SUBCONTRACTOR**

Certifying Affidavit submitted to:

Name of School District: _____

Mailing Address: _____

Name of Contractor: _____

Mailing Address: _____

Project/Agreement: _____

STATE OF TEXAS §

COUNTY OF _____ §

(1) The undersigned representative, on behalf of the subcontracting firm identified below, swears and affirms to _____ Independent School District (the "District") and to the Contractor identified above that such firm has obtained, reviewed and verified, from the Texas Department of Public Safety criminal clearinghouse, the national criminal history record information of all employees of the subcontracting firm who (i) have or will have continuing duties related to the subcontracted services, and (ii) have or will have direct contact with students (substantial opportunity for verbal or physical interaction with students that is not supervised by a certified educator or other professional District employee). The undersigned further certifies that no employees of the subcontracting firm who meet the requirements of (i) and (ii) herein have been convicted of any offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy.

(2) The undersigned representative, on behalf of the subcontracting firm identified below, swears and covenants that no present or future employee of the subcontracting firm, no present or future independent contractor, and no present or future employee or independent contractor of any sub-subcontractor of the subcontracting firm, will provide services to the Project on a continuing basis that involve direct contact with students unless and until such employee's or independent contractor's national criminal history record information has been reviewed, cleared and certified as required herein. In the event of an emergency, an employee or independent contractor who has not been previously certified may only provide services that involve direct contact with students if such employee is escorted by a District employee.

(3) The undersigned firm swears and covenants that, upon receipt of information, directly or indirectly, that any employee or independent contractor of the subcontracting firm has been convicted of an offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy, the subcontracting firm will immediately remove or cause the removal of such employee from the Project or scope of the Agreement and notify the District.

(4) The undersigned firm further certifies that it has obtained certifications from all subcontractors whose employees (i) have or will have continuing duties related to the subcontracted services, and (ii) have or will have direct contact with students (substantial opportunity for verbal or physical interaction with students that is not supervised by a certified educator or other professional District employee), that such subcontractors have obtained, reviewed and verified, from the Texas Department of Public Safety criminal clearinghouse, the national criminal history record information of all employees of the subcontracting firm assigned to perform services to under the Project or Agreement, and that no employees have been convicted of any offense identified in Section 22.085 of the Texas Education Code or prohibited by District policy.

_____, being duly sworn, affirms and certifies that he/she is the _____ (position) of _____ (contracting firm), and that all statements and acknowledgements contained herein are true and correct, and that he/she has the authority to bind such firm to the covenants set out above.

SUBSCRIBED AND SWORN TO BEFORE ME this ____ day of _____, 20_____.

Notary Public _____ State of _____

My Commission expires _____

DIVISION 1 – GENERAL REQUIREMENTS

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.

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 A201 General Conditions and the Supplementary Conditions for additional requirements concerning allowances. If necessary additional requirements will be issued by Change Order (CO).

1. Allowances shall cover the cost to the Contractor of materials, all labor costs, and equipment delivered at the site, overhead, profit, bonds, insurance and all applicable taxes, less applicable trade discounts.
2. PCO (Potential Change Order) will be issued by the A/E via Kahua (Potential Change Order Module) to document and gain authorization to utilize allowance on a particular campus for items not covered in the original contract scope of work.
3. AEA (Allowance Expenditure Authorization) is used for authorization and tracking of use of contract allowances. A separate AEA series is used for each defined allowance.
4. Any needs beyond the means of the contract shall require Change Order(s).
5. CAEA (Contingency Allowance Expenditure Authorization) shall only be used for necessary work authorized by the District and in addition to the contracts defined scope of work or to credit work deleted from the contract as authorized by the District.
6. The contingency allowance (if provided) is not an entitlement to the GC. Unused portions shall be removed from the contract via a final Change Order during contract closure.
7. A CO is only used when no other funding sources are available within the contract and contract value must be increased.
8. A CO is the only method for adding funding or to change the contract work or time (when funding from the contingency allowance included in the Contract is depleted). Types of allowances include the following:
 - a. Types of allowances include the following:
 - i. Lump-sum allowances.
 - ii. Unit-Cost allowances
 - iii. Quantity allowances
 - iv. Contingency allowances.
 - v. CSI Division allowances

- B. Related Sections:

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 21 00 Allowances

-
1. Division 00 Competitive Sealed Proposal Form - Base Bid.
 2. Division 01 Section "Unit Prices" for procedures for using unit prices.
 3. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

- A. Contractor shall advise Architect and owner's representative 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. All specific allowance scope shall be included in the schedule provided by the contractor.
- 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 the Architect.

1.4 SUBMITTALS

- A. Submit proposals for approval of purchase of products or systems included in allowances, in the form specified for Contingency Allowance Expenditure Authorization (CAEA), Allowance Expenditure Authorization (AEA), or as specified in Change Order.
- B. Submit all necessary backup per the contract requirements for approval of PCOs and AEAs.
- C. 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.

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.

3.3 SCHEDULE OF ALLOWANCES

- A. Contingency Allowance Expenditure Authorization (CAEA) is a request for utilization of a specified portion of the contingency allowance included in the GC contract.
- B. An Allowance Expenditure Authorization (AEA) is a request for utilization of a specified portion of an allowance included in the GC contract.
- C. Each CAEA, AEA and CO must be listed separately on the schedule of values (SOV) in the pay application under the appropriate funding category or at the bottom of the SOV.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 21 00 Allowances

-
- D. Change Orders (CO) are a request for utilization of a specific portion of contingency dollars outside the GC contract and it is used when no other funding sources are available within the contract.

End of Section 01 21 00

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DIVISION 1 – GENERAL REQUIREMENTS

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 Competitive Sealed 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

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. A Unit Price is a cost for a unit of work, as described in the Proposal Documents. The Owner may add or deduct Unit Price work at the amounts stated on the Proposal Form and such amounts shall not be subject to additional mark-up by the Contractor or his Subcontractors.
- 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 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 PART 2 - PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

End of Section 1 22 00

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SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the 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 are part of the work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise 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. 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 only be considered if it is a deferred for later consideration.

- D. Schedule: A schedule of alternates is included. 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. Alternate No. 1: Base Bid Adjustment
 - 1. Adjustments from Base Bid as noted in Document 00 21 13 "Instructions to Bidders" and Document 00 72 00 "General Conditions."
- B. Alternate No. 2: Deviations Request Form
 - 1. Deviations from Base Bid as noted in Document 00 21 13 "Instructions to Bidders."
- C. Alternate No. 3: Austin HS - Additional AHUs
 - 1. Additional AHUs as shown on Drawings and Scheduled for Austin High School. Conform to requirements within Divisions 23, 25, and 26.
- D. Alternate No. 4: Austin HS - Additional AHUs
 - 1. Additional AHUs as shown on Drawings and Scheduled for Austin High School. Conform to requirements within Divisions 23, 25, and 26.

END OF SECTION

DIVISION 1 – GENERAL REQUIREMENTS

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: General Contractor to submit a copy of each request for consideration to be reviewed by A/E and owner. 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 25 00 Substitution Procedures

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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, where applicable or requested.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated, where applicable or requested.
 - i. Research reports evidencing compliance with building code in effect for Project, from IBC, where applicable or requested.
 - 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, in the Contract Sum
 3. Acceptance of substitutions will be delivered in writing by A/E, owner's representative or owner. Upon acceptance contractor will follow Section 01 33 00 Submittal Procedures and/or CSI division specifications for accepted substitutions.
 4. Substitutions may be considered only when specified product or material is no longer available in the market; or if the product or

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 25 00 Substitution Procedures

material provides a better value to the Owner and is within, or less than the project budget.

5. This Substitution procedure is not allowed during the Procurement Phase.
6. During the Construction Phase, all substitutions proposed by the GC shall be approved in writing by the A/E and the Owner.
7. Approval: If necessary, Architect will request additional information or documentation for evaluation within a reasonable amount of time from receipt of a request for substitution. Architect will recommend to the owner's representative acceptance or rejection of proposed substitution within a reasonable amount of time from receipt of all required documentation. Owners' representative 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 owner's representative, 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: Owner Provided Substitution Request Form, which can be attached to any of the following (as applicable): Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work with Design Manager and Owner written approval.
 - b. Rejection will include a statement giving reason for rejection from AE or Owner's representative.

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

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 25 00 Substitution Procedures

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- 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.
- A. 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 the discretion of Architect, only when there is an advantage to the Owner.
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 that Owner may 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 via Owner provided Substitution Request Form.
 - e. Requested substitution may 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 25 00 Substitution Procedures

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- 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.
 - B. 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)**

PART 4- **FORMS (attached for your use)**

4.1 Substitution Request Form

End of Section 01 25 00



Substitution Request (Must be submitted within 15 days after date of contract, unless special circumstances exist)	
To: <u>Carolina Fuzetti – Executive Director Design and Construction</u>	Date: _____
AE Firm: _____	Project Manager: _____
BP #: _____ Org No: _____	Project Name: _____
Submission #: _____ Contractor: _____	
Project Type: ___ Addition ___ Renovation ___ New Construction	

SUBSTITUTIONS MUST BE ORIGINATED BY CONTRACTOR & EVALUATED BY A/E / DESIGN AND CONSTRUCTION PRIOR TO SUBMITTAL TO BOND OFFICE.

Description of Substitution:

Reasons for Request: (specified product no longer available, extended warranty, lower initial cost, reduced maintenance cost, better quality, available immediately, schedule improvement, other): _____

Credit due to District, if any: \$ _____.

Reduced Contract Time, if any: _____ days

Product Listing Schedule: (Attach any required documentation)

Related unit-of-work Specifications Section #	
Generic name as used in the Contract Documents	
Proprietary name, model number, and similar product designation	
Prime Contractor Name / Phone #	
Sub-Contractor Name / Phone #	
Rationale: (Why is change needed?)	
Features & Benefits: (What is the benefit to FBISD?)	

Potential Issues: (What are the drawbacks or negative impacts?)	
Construction Impact: (What is the potential impact to cost or schedule?)	
O&M Impacts: (What are the potential impacts to parts & labor maintenance cost, spare parts inventory, and current maintenance practices?)	
Utility Cost Impact: (What is the potential impact on electric, gas and water utility consumption and cost to FBISD?)	
Drawing #	

Page 1 of 2	MODULE: CONSTRUCTION PHASE	4.07
Date Issued: January 7, 2019	SECTION: 4.07 Submittals and Substitutions	
Revision Date: April 17, 2020	TASK/DOCUMENT: 4.07.1 Substitution Request Form Sample	

**Contractor's Certification:**

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 it will perform adequately in the application indicated. The Contractor waives the rights to additional payment or time, which may subsequently be necessary because of the failure of the substitution to perform adequately.

General Contractor's or Representative Signature

Date

	APPROVED	REJECTED	DATE	REASON
A/E's Recommendation (within 2 wks. of receipt)				
FBISD Facilities Recommendation				

Pending Information Noted below:

Final Response to Substitution Request: ____ **Approved** ____ **Not Approved**

District Representative

Date

Project Manager

Date

Design Manager

Date

Refer to Specifications Section 01 60 00 for additional provisions and GC Agreement 3.4.2.1 and 3.5.1.

A/E, PM and/or District are not authorized to waive any code requirements. If the Request is approved, when signed by the District and Project Manager and received by the Contractor, this document becomes effective immediately as a FBISD Approved substitution and the GC Firm shall proceed with the change(s) described above. If the Request is not approved, no changes can be implemented

Page 2 of 2	MODULE: CONSTRUCTION PHASE	4.07
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DIVISION 1 – GENERAL REQUIREMENTS
Section 01 26 00 CONTRACT MODIFICATION 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 handling and processing Contract modifications.
- B. Related Sections:
 - 1. Changes to the Contract may involve close coordination between this Section and Section listed below. Retain Section in subparagraph below that contains requirements Contractor might expect to find in this Section but are specified in other Sections.
 - 2. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS –

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
- B. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change without Owner approval
- C. Within time specified in Proposal Request or five (5) days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - 1. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 2. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 3. Include costs of labor and supervision directly attributable to the change.
 - 4. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- D. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to the Architect.

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Section 01 26 00 CONTRACT MODIFICATION PROCEDURES

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1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

- A. The A/E will issue a work change proposal request using the district's program management information system (PMIS). A potential change order (PCO) will be issued in the PMIS under the PCO module. The contractor will upload all appropriate backup per the requirements in the AIA 201 under section 7. Upon execution of workflow and approval of the PCO the contractor will be provided approval via email or PMIS notification and work can begin. A CO will be issued at a later date to be agreed upon by A/E, contractor and owner's representative.
 1. Construction - PCOs: This category is used to capture any Potential Change anticipated during the life of the projects. All AEA's, CAEA's, and COs are initiated with a PCO as well as any potential item identified by the owner's representative that may end up being voided.
 2. PCOs Reports: Several Prolog Report are available. The categorization established allows reports to be provided for specific categories depending on the request or the audience.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

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C. PROCESS:

1. CCDs will be issued by the A/E via Prolog (Potential Change Order Module) and the documents will be signed via DocuSign.
2. The Project Team will review the GC Construction Schedule for evidence of potential time impact to the Construction Schedule, contract or related contracts. The GC will be required to demonstrate that the change impacts specific critical activities in the overall schedule, and to what extent. Determination of impact to fees and other costs resulting from schedule delays to be provided to owner's representative and the District for review, approval or rejection.
3. The Project Team will conduct a CPM review, and may include preparation of independent fragment analysis where necessary to verify the criticality of the proposed changed work.
4. The PMT may produce a partial CPM schedule that displays any significant time impact of the proposed change for further analysis.
5. The PMT will keep these analyses confidential in a restricted access file.
6. The GC will be required to prepare recovery schedules to minimize delays.
7. Negotiations: The PM will schedule and coordinate the negotiation sessions. Attendees will include the GC, the representatives from the District, the PM and A/E.
8. The Negotiation Team will meet with the GC with the intent to negotiate an agreement. The number of negotiating sessions will be based on the complexity of the issues and the scope of the change.
9. If there is no agreement with the GC during negotiations, and it is determined that the Change is required, the A/E will prepare an AIA Form G714 Construction Change Directive (CCD).
10. If there is an agreement, the A/E will initiate a CO as appropriate.
11. The PM will monitor all CCDs and report the status to the District.
12. Document Control collects required signatures via DocuSign, ensures that files are saved electronically and files the original CCD in the hardcopy files.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

End of Section 01 26 00

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DIVISION 1 – GENERAL REQUIREMENTS

Section 01 29 00 Payment Procedures

PART 1 GENERAL

1.1 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.

1.2 REQUIREMENTS

- A. By the 25th of the month, the Project Manager (PM), the Architect (A/E), and the General Contractor (GC) meet to conduct a quality control of the current month Payment Application with attachments.
- B. The A/E and PM perform visual observations of the work in order to verify GC estimates of job progress, including verification of stored materials in bonded warehouses. The GC, PM and A/E meet to determine appropriate percentages of completion on all items on the Schedule of Values (SOV).
- C. Upon agreement by the PM and A/E, the GC submits Payment Application (Pay App) in District approved format via Kahua, as per GC Agreement with all necessary supporting material. The GC includes any required back-up documents (PDF format) to substantiate work completed, at minimum: SOV, Monthly Schedule with baseline, SBE report.
- D. The A/E reviews the pay application. If there is need for clarification or additional information, the A/E discusses with the GC and obtains the needed information. Upon approval, the A/E approves certifies the Pay Application (Pay App) and approves the workflow in Kahua and notifies PM (via workflow). If the Pay App is not approved, the A/E sends it back to the GC for resubmission.
- E. The PM reviews the pay App. If not approved, sends back to GC for resubmission. If the workflow is approved, Kahua workflow notifies District's Design & Construction (D&C) Construction Manager for review.
- F. D&C Construction Manager reviews and approves the Pay App in Kahua, notifies Controls Manager via Kahua workflow. If the Pay App is not approved, Construction Manager sends Pay App to PM for resubmission.
- G. Controls Manager reviews and approves the Pay App in Kahua, notifies District's Design & Construction (D&C) Director. If the Pay App is not approved, Controls Manager sends Pay App to PM for resubmission.
- H. The District's D&C Executive Director approves the Pay App in Kahua and notifies D&C Budget Accounting Associate (via workflow). If not approved, send Pay App to PM for resubmission.
- I. D&C Accounting Associate reviews and inputs Pay App in PeopleSoft. If not approved send Pay App back to PM for resubmission. If approved send to District's accounting for processing.
- J. District's Accounting processes payment to GC in People Soft and notifies GC. Checks are cut on Tuesdays and Thursdays and issued via Automated Clearing House (ACH) system for electronic checks transfer.
- K. Wednesday and Friday the GC receives payment.

1.3 RELATED SECTIONS/DOCUMENTS

- A. General Conditions: Progress Payment, and Final Payment.
- B. Section 013300 – Shop Drawings, Product Data and Samples

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Section 01 29 00 Payment Procedures

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- C. Section 012973 – Schedule of Values
 - D. Section 013120 – Small Business Enterprise Procedure
 - 1.4 FORMAT
 - A. AIA G702 – Application and Certificate for Payment
 - B. For continuation sheet, use AIA G703 in format at Section 012973 for schedule of values.
 - 1.5 PREPARATION OF PAY APPLICATIONS
 - A. Type required information or use media printout.
 - B. Execute certification by authorized officer.
 - C. Use data on approved 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 one application with a schedule of values for each school with a breakdown in the current CSI format. Payment Application format may be provided by the PM.
 - F. Each school shall have a separate schedule of values for Renovation Work and for Addition Work.
 - 1.6 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 Pay Application via Owners designated software (Kahua). Include with the submission:
 - 1. G702, G703
 - 2. SBE Utilization Report
 - 3. Contractor Release of Liens
 - 4. Sub-contractor Release of Liens
 - 5. Projected Contractor Invoicing schedule (Cashflow) for the next 6 months
 - 6. Updated construction schedule (complying with contract dates)
 - D. Payment Period: Submit at intervals stipulated in the Agreement.
 - 1.7 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.
 - 1.8 FORMAT AND SUBMITTAL REQUIREMENTS
 - A. Set-up format and submittal requirements include but are not limited to the following:
 - 1. Contractor must use AIA G702 and AIA G703 forms for Application for Payment or form provided by PM.
 - 2. All values should be taken to the hundredth (dollar).
 - 3. All items must be broken down by school, by addition/renovation (where applicable). This break down must

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 29 00 Payment Procedures

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- match the breakdown as specified in the GC Contract or established with the Program Manager.
 - 4. All items must be organized by the current CSI division.
 - 5. All items must be broken down by material and labor.
 - 6. All applicable current CSI divisions must be sub-totaled.
 - 7. Each addition/renovation (where applicable) and school must be sub-totaled.
 - 8. 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.
 - 9. All other contract allowances (pre-bid or post-bid) should be specified per the GC contract.
 - 10. General Conditions, P&P Bonds, Insurances, Fees, Building Permits, Mobilization, and De-mobilization must be identified.
- B. Post-set-up format and submittal requirements include but are not limited to the following:
- 1. Contractor may not change the "scheduled values" after approval of the Schedule of Values (SOV) by the A/E, PM, and FBISD (at first Application for Payment).
 - 2. Include FBISD P.O. number on AIA G702.
 - 3. Include FBISD P.O. number in application number. For example, "222123-3" would be the third Application for Payment for P.O. 222123.
 - 4. Certified by A/E.
 - 5. Previous invoice totals match previous invoice.
 - 6. Attach an SBE Pay Sub Contractor/Sub Consultant Utilization Report, signed or acknowledged by e-mail or waiver by all SBE subcontractors. (Acknowledgment must include amount paid during current period.)
 - 7. Attach an SBE Pay Sub Contractor/Sub Consultant / Suppliers Payment Certification Form, signed or acknowledged by e-mail or waiver by all SBE subcontractors. (Acknowledgment must include amount paid during current period.)
 - 8. Attach a schedule for each project, updated for the billing period, with Substantial Completion dates per GC contract or applicable CO.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

End of Section 01 29 00

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DIVISION 1 – GENERAL REQUIREMENTS

Section 01 29 73 Schedule of Values

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Provisions established within the General, Supplementary and Other Conditions of the Contract, Division 01 – General Requirements, and the Drawings are collectively applicable to this Section.

1.2 REQUIREMENTS INCLUDED

- A. Procedures for preparation and submittal of Schedule of Values (SOV).

1.3 RELATED SECTIONS/DOCUMENTS

- A. General Conditions.
- B. Section 01 29 00 – Payment Procedures.

1.4 FORMAT

- A. Print SOV 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.

1.5 CONTENT

- A. Using the current Master Format™ Edition, in CSI format, each school shall have a separate SOV for Renovation Work and for Addition Work, as applicable.
- B. In CSI format, list installed value of each major item of Work to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar. All values should be taken to the Dollar.
- C. List Owner Controlled Contingency Allowance and other allowances with the specified monetary amount for each allowance in separate divisions.
- D. Contractor to use separate lines for bonds, insurance, temporary facilities and controls, superintendents, mobilization, and demobilization. Each item shall include prorated portion of overhead and profit.
- E. Provide line item for safety on the SOV.
- F. Provide line item for closeout on the SOV.
- G. The sum of the values listed shall equal total Contract Sum.

1.6 SUBMITTAL

- A. GC prepares and submits a SOV timely prior to the submittal of the first pay application and that the A/E and PMT reviews and responds prior to the approval of the first pay application.
- B. Upon resolution of issues, the PM is responsible for providing a letter accepting the SOV.
- C. Payment against the approved SOV is based on earned value which is derived from the status of the construction as observed by the A/E and PM.
- D. Submit a copy via Kahua transmittal of the SOV within ten (10) days of award of contract and prior to Pre-Construction Meeting or first pay application.
- E. Identify Project by title and number.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 29 73 Schedule of Values

F. Secure the A/E and owner's representative (PM) approval of the SOV prior to submitting the first Pay Application.

G. The activities on the SOV are to reflect construction by area or phase.

H. Breakdown all costs into equipment, materials, and labor.

1.7 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 PART 3 – EXECUTION (Not Applicable)

End of Section – 01 29 73

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 31 00 Project Management and Coordination

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, specifications, 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.
 - 5. Closeout Procedures
- B. Related Sections:
 - 1. Division 01 Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Division 01 Section 01 77 00 "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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 31 00 Project Management and Coordination

7. Project closeout activities.
8. Startup and commissioning of systems.

1.5 KEY PERSONNEL

- A. Key Personnel Names: Within ten (10) days following Notice to Proceed, submit a list of key personnel per submittal procedures in 01 33 00, including superintendent and other personnel in attendance at Project site. Identify individuals; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses.
 1. Post copies of list in project meeting room, in temporary field office, in construction safety manual, and provide copies electronically to AE, owner's representative or others upon request. 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 Program Manager's electronic project management software.
 1. Architects will respond to RFIs that are initiated by the contractor and not by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 3. Contractor uses the RFI to request direction and/or clarification resulting from, but not limited to the following:
 - a. Conflicts, omissions, ambiguities, or discrepancies within the Contract Documents
 - b. Conflicts between the Contract Documents and any provision of code or regulation applicable to the performance of the work
 - c. Conflicts between the Contract Documents and any standard specification or instruction of a manufacturer
 - d. Conflicts with differing existing conditions.
- 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.

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Section 01 31 00 Project Management and Coordination

11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 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 Owner's designated software with substantially the same content as indicated above.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received on 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 may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing via the owner's designated software 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 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 Owner's designated software.

1.7 PROJECT MEETINGS

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 31 00 Project Management and Coordination

- A. Preconstruction Conference: Architect and Project Manager 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 and its superintendent; 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 any or all of the following:
 - a. Introductions
 - b. Submission of Post Proposal Information if any outstanding
 - c. Tentative Construction schedule.
 - d. Meetings: dates, locations, attendees, types, agendas
 - e. Communication: Owner's representative electronic project management software, correspondence flow
 - 1) Lines of communications
 - f. Schedule:
 - 1) Phasing
 - 2) Critical work sequencing and long-lead items
 - g. Designation of key personnel and their duties
 - h. Procedures for processing field decisions and Change Orders
 - i. Procedures for RFIs
 - j. Consultant / Lab Notification Requirements
 - 1) HazMat
 - 2) Roofing
 - 3) Envelope
 - 4) Test & Balance
 - 5) Materials Testing
 - 6) Commissioning
 - 7) Other Inspections as applicable.
 - k. Procedures for processing Applications for Payment
 - 1) AIA G702 and G703 (Schedule of Values)
 - 2) Cash flow
 - 3) Updated Schedule
 - 4) AE Review
 - 5) SBE
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 31 00 Project Management and Coordination

- n. Preparation of record documents.
 - o. Use of the premises and existing building
 - p. Work restrictions.
 - q. Working hours.
 - 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 disruptions and shutdowns.
 - u. Safety
 - 1) Emergency Contact List
 - 2) First aid.
 - 3) Site Security.
 - v. Progress cleaning.
- 4. Minutes: Architect will record and distribute meeting minutes using the Program Manager's electronic project management software.
- B. Progress Meetings: The architect and the Project Manager 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 will be held at the discretion of the PM.
 - 3. AE will prepare agenda, distribute notice of the meeting, PM will preside at meetings. AE will record minutes and distribute copies within five (5) days after meeting to participants, and to entities affected by decisions at meetings. Distribution will come from owner's software or email.
 - 4. Coordinate dates of meetings with preparation of payment requests.
 - 5. Attendees:
In addition to representatives of Owner, Owner's representative, Professional Consultants, as appropriate to the agenda, and Architect, each contractor, job superintendent, subcontractor,

DIVISION 1 – GENERAL REQUIREMENTS
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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 will contain some or all of the content below:
 - 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 including PCOs.
 - 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) PCOs, CAEAs and related log reviews
 - 7) Review of draft Application for Payment, as necessary.
 - 8) For new schools: LEED Certification status and strategy.
 - 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.

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7. Minutes: Using the Owner's designated software, the entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
 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.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following as applicable:
 - a. Contract Documents.
 - b. Related RFIs.
 - c. Submittals.
 - d. Review of mock-ups.
 - e. Possible conflicts.
 - f. Compatibility problems.
 - g. Time schedules.
 - h. Weather limitations.
 - i. Manufacturer's written recommendations.
 - j. Warranty requirements.
 - k. Compatibility of materials.
 - l. Acceptability of substrates.
 - m. Space and access limitations.
 - n. Testing and inspecting requirements.
 - o. Installation procedures.
 - p. Coordination with other work.
 - q. Required performance results.
 - r. Protection of adjacent work.
 - s. Protection of construction and personnel.
 - t. For new schools: LEED Certification status and strategy.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions. The meeting minutes will be documented by the GC.
 4. Reporting: GC shall 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. Reinstallation Conference: When required in individual Specification Sections, convene a reinstallation conference at work site prior to commencing work of the section.

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Section 01 31 00 Project Management and Coordination

1. Require attendance of entities directly affecting or affected by Work of the Section.
 2. Notify Owner, PM and Architect at least seven (7) days in advance of meeting date.
 3. GC shall prepare agenda, preside at conference, record minutes, and distribute copies within five (5) 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, Owner's representative and Architect, but no later than thirty (30) 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, Owner's representative, 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: Preparation of record documents.
 - a. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - b. Submittal of written warranties.
 - c. Requirements for preparing operations and maintenance data.
 - d. Requirements for demonstration and training.
 - e. Preparation of Contractor's punch list.
 - f. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - g. Submittal procedures.
 - h. Responsibility for removing temporary facilities and controls.
 - i. Review of General Contractor Close Out Checklist (see Part 3 – Execution)
 - j. Commissioning
 - k. Testing and Balancing.
 4. Minutes: Architect will record and distribute meeting minutes using the Owner's designated software.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

- 3.1 The General Contractor Close-out checklist will be completed by the owner's representative, architect, and general contractor. A copy will be submitted with the substantial completion AIA G704 and the certificate of final completion. The checklist can be found under section 01 77 00.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 31 00 Project Management and Coordination

End of Section 01 31 00

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DIVISION 1 – GENERAL REQUIREMENTS

Section 01 31 13 Project Coordination

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.

1.2 RELATED REQUIREMENTS

- A. Section 01 32 16: Construction Schedule.
- B. Section 01 33 00: Submittal Procedures.
- C. Section 01 45 23: Test and Balance and Commissioning for HVAC.
- D. Section 01 77 00: Contract Closeout.

PART 2 PRODUCTS (Not used)

PART 3 EXECUTION

3.1 COORDINATION

- A. Contractor shall coordinate operations included in various sections of Contract Documents to assure efficient and orderly installation of each part of Work. Coordinate Work operations included under related sections of Contract Documents that depend on each other for proper installation, connection, and operation of Work, including but not limited to:
 - 1. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
 - 3. Provide provisions to accommodate items scheduled for later installation.
 - 4. Prepare and administer provisions for coordination drawings.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required in notices, reports, attendance at meetings, and:
 - 1. Prepare similar memoranda for Owner and Separate Work Contract where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, following:
 - 1. Preparation of schedules.
 - 2. Installation, relocation, and removal of temporary facilities.
 - 3. Delivery and processing of submittals.
 - 4. Progress meetings.
 - 5. Project closeout activities.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 31 13 Project Coordination

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- D. Conservation: Coordinate Work operations to assure operations are carried out with consideration given to conservation of energy, water, materials, and:
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into Work.

3.2 SUBMITTALS

- A. Coordination Drawings: Contractor shall prepare coordination drawings to coordinate the installation of products and materials fabricated, furnished and installed by separate entities, under different parts of the Contract. Contractor shall notify Owner and Architect of all major conflicts in writing in a timely manner so that the design team can respond without construction delays. Coordination drawings shall address the following at a minimum:
 - 1. Limitations in available space for installation or service. Contractor shall overlay plans of each trade and verify space requirements and conflicts between trades. Minor changes and adjustments that do not affect design intent shall be made by Contractor and shall be highlighted for Architect's review.
 - 2. Incompatibility between items provided under different trades (such as difference in voltage between equipment specified under Divisions)
 - 3. Inconsistencies between drawings, specifications and codes (between trades and within each trade).
 - 4. Additional items required for existing facilities construction projects shall be designed and prepared from available as-built drawings that are verified through non-invasive and non-destructive, visual observation only. Contractor shall field verify actual existing conditions during and upon completion of demolition work and incorporate findings into preparation of co-ordination drawings. Minor changes and adjustments that do not affect design intent shall be made by Sub-Contractor and shall be highlighted for Owner and Architect's reviews.
- B. Prepare coordination drawings in CAD with each trade on a separate layer, in specified color and scale. Contractor and each Subcontractor shall provide and forward reproducible copies and CAD drawing files in the order described here:
 - 1. Structural shop drawings shall indicate location and sizes of columns, beams and other structural members, as well as wall, roof and slab penetrations, and will be provided to mechanical, electrical, low voltage and plumbing Sub-contractors for co-ordination. Structural items shall be indicated using black lines.
 - 2. HVAC Subcontractor will indicate all ductwork, piping and equipment complete with installation and dimensioned service clearances, duct and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger and support locations. Minor changes and adjustments that do not affect design intent shall be made by Subcontractor and shall be

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 31 13 Project Coordination

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- highlighted for Owner and Architect's reviews. Forward drawings to plumbing, electrical and low voltage Subcontractor for further coordination. HVAC items shall be indicated using orange lines.
3. Plumbing Subcontractor will indicate all plumbing lines, and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger/support locations. Coordinate with HVAC Subcontractor. Minor changes and adjustments that do not affect design intent shall be made by Sub-contractor and shall be highlighted for Owner and Architect's reviews upon completion drawings shall be forwarded to Fire Sprinkler Subcontractor for further coordination. All Plumbing items shall be indicated using blue lines.
 4. Fire Sprinkler Subcontractor will indicate fire sprinkler piping and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger or support locations. Coordinate with Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-contractors and shall be highlighted for Owner and Architect's reviews. Upon completion drawings shall be forwarded to Electrical and Low Voltage Contractor for further coordination. Fire sprinkler equipment shall be indicated using red lines.
 5. Electrical and Low Voltage Subcontractors will indicate service and feeder conduit runs and other electrical equipment complete, including low voltage with installation and dimensioned service clearances, sizes, top or bottom of conduit and rack elevations, distances of conduits and equipment from building reference points and hanger and support locations. Coordinate with Fire Sprinkler, Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-contractors and shall be highlighted for Owner and Architect's reviews. Upon completion drawings shall be forwarded to Contractor for further coordination. Electrical work shall be indicated in dark green lines. Low voltage work shall be indicated in light green lines.
 6. Contractor will be responsible for the overall coordination review. As each coordination drawing is completed, Contractor will meet with Owner to review and resolve all conflicts on coordination drawings.
 7. Coordination meetings will be held in Project field office of Contractor. Contractor is required to distribute Shop Drawings, cut sheets and submittals to Subcontractors where appropriate. Reviewed coordination drawings will be maintained in Project field office of Contractor. Meeting minutes shall be developed by Contractor and submitted to Owner within 5 days.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 31 13 Project Coordination

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8. GC will provide coordination effort for Owner provided consultants (included, but not limited to, Material Testing, Roofing Commissioning, Testing and Balancing) to ensure that activities meet contractual and schedule requirements.

End of Section 01 31 13



Fort Bend Independent School District

Small Business Enterprise Program Procedures
Spring 2023

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I. SUMMARY OF FORT BEND INDEPENDENT SCHOOL DISTRICT'S SMALL BUSINESS ENTERPRISE PROGRAM

Fort Bend Independent School District's Small Business Enterprise Program ("SBEP" or the "Program") was created to provide increased business opportunities for locally certified small businesses to participate in contracting and procurement at Fort Bend Independent School District (FBISD).

Shown below are the key features of the Program.

- The SBEP is a goal-oriented program, requiring contractors to whom FBISD awards prime contracts for design services or construction services to use "Good Faith Efforts" to utilize certified small businesses.
- The Program applies only to SBEP Eligible contracts, defined as all contracts for architectural design services, engineering design services or construction services valued at \$50,000 or greater, except contracts for sole-source items, federally funded contracts, contracts with other governmental entities, and those contracts that are otherwise prohibited by applicable law or expressly exempted by FBISD. The SBEP shall not apply to contracts for goods and non-construction services.
- The SBEP is a race and gender-neutral program.
- FBISD has set an annual SBEP participation goal of twenty-five (25%) percent of the dollar amount of all SBEP-Eligible contracts. FBISD recognizes that individual actual participation may vary based on subcontracting opportunities, availability of small businesses, and price competitiveness. The participation goal may change from year to year based on all relevant factors considered.
- To participate, small businesses must be certified by an agency or organization whose certification is recognized by FBISD. Certification is based on the firm's gross revenues or number of employees averaged over the past five years, inclusive of any affiliates as defined by 13 C.F.R. § 121.103, does not exceed the size standards as defined pursuant to Section 3 of the Small Business Act and 13 C.F.R. § 121.201.
- The U.S. Small Business Administration-SBA.gov website [Qualifying as a Small Business](#).

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The Small Business Enterprise Program provides benefits to the small business including:

- Providing assistance to small businesses, by providing information and support.
- Assisting small businesses by offering training and information regarding insurance and surety bonding.
- Requiring prospective vendors to provide written assurance of small business participation in their proposals for SBEP Eligible contracts.
- Providing workshops on issues frequently encountered by small businesses during the proposal process and generally while performing work at FBISD.
- Maintaining an updated small business directory and source list(s) to help identify qualified and available small businesses; providing information on the FBISD website about opportunities to do business with FBISD.
- Providing information on the FBISD website about SBEP Eligible procurements.

II. OPERATIONAL PROCEDURES

The procedures herein are established to govern the program components of the SBEP, including, without limitation, program compliance, certification, specific implementation measures, small business status verification, and reporting of small business participation.

A. SCOPE

These procedures apply to all FBISD Departments, architectural/engineering firms, and general contractors performing work on SBEP Eligible contracts, and all certified Small Business Enterprises. These procedures apply to those SBEP-Eligible contracts as defined herein.

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B. OVERALL ANNUAL SBEP GOAL

1. An overall annual goal for small business participation in architectural design services, engineering design services, and construction services at FBISD is set at twenty-five (25%) percent of the dollar amount of all SBEP-Eligible contracts.

FBISD staff shall provide updates/reports, when needed, to the FBISD Board of Trustees calculating small business utilization.

2. An SBEP-Eligible contract may otherwise be exempt from a small business goal if it is determined that one or more of the following is present:
 - a. A public or administrative emergency exists that requires the goods or services to be provided with unusual immediacy; or
 - b. The goods or services requested are of such a specialized, technical, or unique nature as to require FBISD to be able to select its contractor without application of small business provisions; or
 - c. The application of small business provisions would impose an unwarranted economic burden or risk on FBISD, would unduly delay acquisition of the labor, goods or services, or would otherwise not be in the best interest of FBISD; or
 - d. The possible small business participation level based on small business availability would produce negligible or no small business participation.

All SBEP exemptions must be approved by an authorized FBISD representative.

C. PROGRAM ACTIVITIES AND RESPONSIBILITIES

In an effort to maximize the Program's activities, the following procedures are in place to maximize opportunities for small business participation:

1. FBISD has designated the Small Business Enterprise Program Coordinator to implement the District's structured small business program under the direction of the FBISD Design and Construction Department.
2. FBISD may designate staff members to act as advisors and to work directly with small businesses and contractors to provide information, assistance, and support. FBISD's Small Business Enterprise Program Coordinator and/or staff will undertake various tasks to make the Program workable, including the following:
 - Coordinate workshops and/or training sessions for small businesses on challenges frequently encountered by small businesses during the proposal process and generally when performing work for FBISD;

- In coordination with the Purchasing Department, provide specifications and requests for proposals to the small business community in a timely manner, to allow small businesses adequate opportunity to develop responsible and responsive quotations and proposals;
- Enhance the FBISD database to identify SBEP-Certified Small Businesses and assist Contractors in identifying SBEP-Certified Small Businesses with which to subcontract;
- Participate in pre-proposal seminars, when needed, to explain small business requirements, including explanation of the forms that must be submitted with a proposal;
- Coordinate outreach activities for small businesses to ensure access and opportunity to compete;
- Conduct internal information sessions to inform and acquaint FBISD staff with the goals and objectives of the SBEP and to sensitize them to the problems of small businesses;
- Maintain lists of SBEP-Certified Small Businesses and coordinate with listings from other agencies, e.g., Port of Houston Authority SBE Certification, Metropolitan Transit Authority of Harris County (METRO) SBE Certification, and City of Houston SBE Certification. These lists will be offered to contractors and FBISD staff to assist in program implementation;
- Maintain records showing specific efforts to identify and award Contracts to small businesses and establish a monitoring system to ensure that all Contractors, Subcontractors, consultants, and vendors comply with Contract specifications related to small business enterprise utilization;
- Maintain and update the FBISD website on the SBEP proposals and on other opportunities to do business with FBISD; and
- In coordination with the Purchasing Department, inform small businesses of proposal notices and specifications related to their capabilities by placing proposal notices in the appropriate trade bulletins, local newspapers, and other periodicals and informing local trade associations, technical assistance agencies, economic development groups, and small businesses with capabilities relevant to the proposal.

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3. FBISD shall update the website to assist small businesses and Contractors. The website will contain the following:
 - Procedures outlining specific steps regarding how to submit a proposal;
 - Prerequisites for submitting proposals on contracts;
 - Information regarding how plans and specifications can be obtained;
 - Names of persons to contact concerning questions on proposal documents; and
 - Names of Procurement officers and office hours
4. FBISD will maintain and have available an updated small business directory and source list(s) per proposal solicitation to facilitate identifying small businesses with capabilities relevant to general contracting requirements and to particular solicitations. FBISD will make the directory and source list(s) available to contractors to assist their efforts to meet the small business requirements.

D. PURCHASING METHODS

Purchasing methods used by FBISD for construction services may include Competitive Sealed Proposals, Design-Build, Construction Manager-at-Risk, Construction-Manager-Agent and Job Order Contracting. In deciding which purchasing method to utilize, FBISD will determine which purchasing method provides the best value to FBISD, in accordance with the law and Board Policy.

Offeror's who tender a Statement of Qualifications response are required to provide evidence of their intent and ability to fulfill the goals of the Small Business Enterprise Program.

NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, NO CONTRACTOR OR ANY OTHER PERSON OR FIRM IS INTENDED TO OR SHALL DERIVE ANY LEGAL OR EQUITABLE RIGHTS, DIRECTLY OR AS A THIRD PARTY BENEFICIARY, FROM FBISD'S SBEP. NOTHING IN THE SBEP SHOULD BE CONSTRUED TO GIVE A CONTRACTOR OR SUBCONTRACTOR A PROPERTY INTEREST IN A BID, PROPOSAL OR CONTRACT PRIOR TO THE FBISD BOARD OF TRUSTEES' AWARD OF THE CONTRACT AND COMPLIANCE WITH ALL STATUTORY AND OTHER LEGAL REQUIREMENTS.

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E. CERTIFICATION PROCEDURES

Fort Bend Independent School District's SBEP requires prior certification of a small business in order to count the participation of that small business toward program goals.

1. Eligibility Requirements for Certification

To be eligible for certification as a small business, each applicant must do the following:

- Demonstrate that the firm's gross revenues or number of employees averaged over the past five years, inclusive of any affiliates as defined by 13 C.F.R. § 121.103, does not exceed the size standards as defined pursuant to Section 3 of the Small Business Act and 13 C.F.R. § 121.201;
- Complete an SBEP application form for one of the FBISD approved certifying agencies.
- Obtain certification from one of the FBISD recognized certifying agencies.

2. Certification Process

- a. To be eligible to participate in the SBEP, a small business must have certification of its small business status. Certifications may be obtained from public and private agencies that certify small businesses. FBISD does not represent that any particular agency employs the same definition of "small business" as that used by FBISD. It is the responsibility of the applicant to choose an agency for certification that uses FBISD's definitional criteria for small business.

FBISD recognizes certification by the following agencies:

Port of Houston Authority SBE Certification;

Metropolitan Transit Authority of Harris County (METRO) SBE Certification;

City of Houston SBE Certification; and

Small Business Administration—SBA 8a (if authorized by the District for a procurement)

FBISD has the right to revoke acceptance of a business as a certified or qualifying small business and to conduct certification reviews in accordance with these Procedures. If a small business experiences any change in its certification status with its certifying agency (i.e. amendments, decertification, termination, graduation), the small business shall immediately notify FBISD of such change.

When an SBE certificate expires, a notification will be generated and submitted to the business. The business should obtain recertification through one of the certifying agencies accepted by FBISD, and forward the recertification certificate to the FBISD Small Business office within 10 business days.

3. Recertification Requirement

A small business application is valid through the certification date provided by the certifying agency. To reapply, a business must submit a renewal application and evidence of continuing eligibility and certification to the FBISD certifying agency.

4. Revocation

FBISD may revoke a previously approved application if it determines that the business does not meet the definition of a small business, or if the business fails to provide requested information in connection with an application review conducted by FBISD. A business may be disqualified from participation in the SBEP if the business fails to provide evidence of certification to FBISD. FBISD may also revoke a previously approved application if it determines that the small business is operating as a pass-through business or a non-small business affiliate. If a question arises regarding certification, FBISD will continue to count the previously certified small business as a SBEP Certified Small Business until the business's small business certification expires or is officially revoked.

5. Certification Reviews

FBISD may conduct random certification reviews of certified businesses by auditing them to verify that the information submitted by the business is accurate and that the business remains eligible after certification has been granted. An application approval is subject to revocation if it is determined that a business does not qualify as a SBEP Certified Small Business under the terms of this Program. Certification reviews maybe conducted for any business that FBISD determines a certification review is warranted.

6. Limitations

Notwithstanding any other provision of this Program, except upon a finding of good cause by FBISD, a firm shall be eligible to participate in the program until it can no longer qualify for reasons of growth or change in status.

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F. PROCEDURES FOR DETERMINING SATISFACTION OF GOOD FAITH EFFORTS REQUIREMENT

1. Each bidder, proposer, or respondent (hereinafter collectively referred to as "Proposer") must acknowledge FBISD's Non-Discrimination and Harassment Policy, which will be published in all solicitation documents. Said acknowledgment must include a statement evidencing the Proposer's awareness of FBISD's policy of nondiscrimination and affirmatively state that the Proposer has not and will not discriminate against any person or company on the basis of age, color, ethnic background, disability, family status, gender, national origin, race, religion, sex, sexual orientation, or veteran status in its participation in any aspect of the SBEP.
2. The Proposer must submit a Contractor's Small Business Plan (the "Plan") setting out how the SBEP goal for the proposed project is to be met. The Plan is to be submitted with the proposal response or within a period designated within the solicitation document, or upon notification of finalist or successful Proposer status. The Plan should be a simple, short statement of small business participation in the SBEP Eligible Contract. The Plan must include a list of SBEP Certified Small Businesses proposed as Subcontractors and suppliers. All small businesses listed must be approved as SBEP Certified Small Businesses by FBISD.

The Plan must also include an SBE Participation Report for all listed small businesses, including the name of each small business, description of the scope of work to be performed, and the dollar value and percentage amount for each small business Contract.

Agreements between a Proposer and a small business in which the small business promises not to provide subcontracting quotations to other Proposers shall be prohibited.

3. The Proposer shall adhere to the Plan submitted unless a waiver is received from the Small Business Enterprise Program Coordinator or FBISD authorized representative.
4. If the Proposer is unable to meet the SBEP goal, the Proposer must submit documentation of Good Faith Efforts to meet the small business participation goal. Such documentation shall be presented to the Small Business Enterprise Program Coordinator for review.
5. FBISD may consider future procurements, if a contractor failed to make Good Faith Efforts to meet the contract small business participation goal.

G. PROCEDURES FOR EVALUATING SMALL BUSINESS PARTICIPATION

Prior to any consideration of a bid or proposal for contract award, FBISD staff shall review submitted bids and proposals for verification of SBEP participation.

The staff evaluation process may utilize a point system based on evaluation criteria set forth in the procurement methods. A designated number of points will be set aside for small business participation, if applicable. Proposers may receive none, some, or all of the designated small business participation points, based on the Proposer's plan to satisfy small business participation goals. If, in the opinion of FBISD staff, the Proposer's response completely meets the stated small business participation goals, the total amount of eligible points will be awarded for small business participation.

The following is a sample point distribution sliding scale to be included in solicitation documents. FBISD reserves the right to adjust the sliding scale values published in a given solicitation, as deemed in the best interest of FBISD for that particular solicitation.

Proposed SBE Subcontracting Goal	Available Points
Less than 5%	0
5% - 9%	1
10% - 14%	2
15% - 19%	3
20% - 24%	4
25% or more	5

Points shall be awarded in accordance with the Proposer's response based on the architectural firm, engineering firm, or general contractor's commitment to small business subcontracting stated in the solicitation document and the point distribution sliding scale.

If the Proposer itself is a Certified Small Business who plans to self-perform work, the value of such self-performed work shall be included in calculating the eligible points for small business participation to the Certified Small Business Proposer, in addition to the value of work subcontracted to another small business.

If the Proposer itself is not a Certified Small Business, but has joint-ventured with another Certified Small Business, only the value of work to be self-performed by the Certified Small Business architectural firm, engineering firm, or general contractor will be included in calculating the eligible points for small business participation to the Small Business Proposer/joint venture, in addition to the value of work subcontracted to another small business.

H. PROCEDURES FOR REPORTING SMALL BUSINESS PARTICIPATION

1. Once the contract is awarded, the following guidelines should be utilized to report small business participation in the awarded contract, as the measure of its progress in meeting SBEP goals:
 - a. If the small business is a subcontractor, FBISD will count toward applicable small business goals the portion of the total dollar value of a contract that is subcontracted to the small business.
 - b. If the small business subcontractor is a part of a joint venture, FBISD will count toward applicable small business goals a portion of the total dollar value of a contract with an SBEP-eligible joint venture equal to the percentage of the ownership of the small business partner in the joint venture, or the participation of the small business partner in the contract.
 - c. If the solicitation contemplates the use of small business subcontractors and a small business is the prime contractor, FBISD may require the prime contractor small business to utilize other small businesses as subcontractors, and count toward applicable small business goals as provided below.
 - d. If the solicitation contemplates the use of small business subcontractors and a small business is the firm or general contractor, FBISD will count small business participation in two separate ways as follows:
 - i. FBISD will count the total dollar value of the contract awarded to the SBEP eligible firm or general contractor toward applicable small business goals if the firm or general contractor small business performs 100% of the work itself or subcontracts with other SBEP Certified Small Businesses to complete 100% of the work. However, if the firm or general contractor small business utilizes a non-small business subcontractor, FBISD will count the total dollar value of the awarded contract to the firm or general contractor small business, minus the dollar amount subcontracted to non-small businesses. FBISD will count toward applicable small business goals contract awards where good or services are procured from a small business in the form of a prime contractor and without additional small business subcontracting.
 - i. FBISD will count toward applicable small business goals only expenditures to small businesses that perform a commercially acceptable function in the work of a contract. FBISD will count toward the applicable small business goals only expenditures to SBEP Certified firm or general contractors or SBEP Certified first-tier subcontractors. Expenditures to subcontractors below the first-tier subcontract level will not be counted toward an applicable small business goal.

- e. FBISD will count toward applicable small business goals contract expenditures for materials and supplies obtained from small business distributors and small business manufacturers, provided that these businesses assume the actual and contractual responsibility for the provision of the materials and supplies, and are a first-tier subcontractor/supplier.
- f. FBISD will count toward applicable small business goals the following expenditures to small business firms that are not manufacturers or distributors:
 - i. The fees or commissions charged for providing a bona fide service, such as professional, technical, consultant, or managerial services, and assistance in the procurement of essential personnel, facilities, equipment, materials, or supplies required for performance of the contract, provided that the fee or commission is determined by FBISD to be reasonable and not excessive as compared with fees customarily allowed for similar services.
 - ii. The fees charged for delivery of materials and supplies required on a job site (but not the cost of the materials and supplies themselves) when the hauler, trucker, or delivery service is not also the manufacturer of, or a regular dealer in, the materials and supplies, provided that the fee is determined by FBISD to be reasonable and not excessive as compared with fees customarily allowed for similar services.
 - iii. The fees or commissions charged for providing any bonds or insurance specifically required for the performance of the contract, if the fee or commission is determined by FBISD to be reasonable and not excessive as compared with fees customarily allowed for similar services. SBEP Certified Small Business subcontractors, and shall assure that all such contracts contain the terms set out in all required SBEP provisions.
- 2. Prior to award, the firm or general contractor shall designate a SBEP contact person who will administer the firm or general contractor's SBEP commitments and who shall be responsible for maintenance of records of Good Faith Efforts to subcontract with SBEP Certified Small Businesses.
- 3. After award, the firm or general contractor shall (1) submit FBISD Small Business Enterprise Program Utilization Reports to the SBEP office; and (2) make timely payments to all persons and entities supplying labor, materials, or equipment for the performance of the contract.

4. In the event a SBEP Certified Small Business is suspended or removed for any reason, the firm/contractor shall make a Good Faith Effort to replace the small business with another SBEP Certified Small Business.
5. Non-discrimination and Legal Compliance. The SBEP adheres to the FBISD's Non-Discrimination and Harassment Policy. A firm/contractor or SBEP Certified Small Business may be found to have failed to satisfy the Good Faith Efforts of the SBEP if the firm/contractor or SBEP Certified Small Business violates FBISD's Non-Discrimination and Harassment Policy. Furthermore, violations of federal or state law or significant ordinances or regulations of any governmental unit may be deemed a failure to satisfy the Good Faith Efforts of the SBEP.

I. QUALITY CONTROL/QUALITY ASSURANCE

- Architect/Engineer Firm or General Contractor will provide notification to FBISD of SBE subconsultant/subcontractor change.
- Architect/Engineer Firm or GC will provide final SBE Utilization form listing all SBE's used on the project to the FBISD Small Business office.
- Contractor Utilization Report demonstrates the Bidder/Proposer's commitment to prompt payment, non-discrimination practices, the release of retain- age and the inclusion of these clauses in its subcontractor agreements.

The Pledge must set forth:

- A pledge that all subcontractors will be paid within FBISD guidelines from the Bidder/Proposer receiving payment from FBISD for amounts previously invoiced.
- An affirmative statement by the Bidder/Proposer that it has adhered to FBISD Non-discrimination Mandate.
- For construction contracts only retainage will be released to all sub-contractors within 30 days after satisfactory completion and approval of work performed.
- Confirmation that the Bidder/Proposer will include the above clauses in its subcontractor agreements.
- Score Card to constitute SBE Participation goal met.



FORT BEND INDEPENDENT SCHOOL DISTRICT
SUB-CONTRACTOR/SUB-CONSULTANT (INCLUDING SMALL BUSINESS ENTERPRISES) UTILIZATION REPORT

1. Project Name	2. Project Number	3. Application Number	4. Application Date	5. Reporting Period From: To:	6. SBE Goal	7. Scheduled Completion

This report is required by Fort Bend ISD – Failure to comply may result in FBISD commencing proceedings to impose sanctions on the Contractor/Consultant. In addition to pursuing other legal remedies, sanctions may include the withholding of payments for work committed to Small Business Enterprises (SBE) participants and a negative recommendation on future bids by the Contractor/Consultant for Fort Bend ISD.

☐ **Note: SBE reporting for this pay period not applicable.**

8. Prime Contractor/Consultant's Name				9. Phone () ()	10. Fax () ()
11. Contractor/Consultant's Street Address / Suite # City State Zip			12. Project Manager (Prime)	13. PM's Phone # () ()	14. PM.'s Fax () ()
15. Current Contract Amount	16. Total Draw This Month	17. % SBE Billed to Date	18. Total Draw on Project to Date	19. % Complete to Date	

20. Federal ID Number	21. Sub-contractor / Sub-consultant	22. SBE Status	23. Work Description	24. Amount for Project	25. Amount of Current Draw	26. Total Billed to Date	27. Actual Start Date	28. Scheduled Completion Date

Commencing contract award, partial release of lien is expected from each Sub-contractor / Sub-consultant and shall accompany any application and certification for payment. Prompt payment to CONTRACTOR/CONSULTANT is dependent on appropriate documentation. The signature below of corporate officer attests to the accuracy of the information.

Company Seal

Signature of Company Officer

Date

Title

Telephone Number

STATE OF TEXAS, _____ COUNTY
IN WITNESS WHEREOF, I have hereunto set my hand
and official seal this _____ day of _____,
20__.

Notary Public, State of Texas

My Commission Expires _____

PROJECT NAME	CONTRACTOR'S NAME

20. Federal ID Number	21. Sub-contractor / Sub-consultant	22. SBE Status	23. Work Description	24. Amount for Project	25. Amount of Current Draw	26. Total Billed to Date	27. Actual Start Date	28. Scheduled Completion Date
	Total Small Business Sub-contractor(s)/Sub-consultant(s)			\$	\$	\$		
	Total Non-Small Business Sub-contractor(s)/Sub-consultant(s)			\$	\$	\$		
	Total Sub-contractor(s)/Sub-consultant(s)			\$	\$	\$		

INSTRUCTIONS

1.	Name of Project	21.	Business name of Sub-contractor / Sub-consultant
2.	Project Number – (If applicable)	22.	Sub-contractor's / sub-consultant's SBE Certification Designation as applicable (SBE=Small Business Enterprise; N=Non-Small Business Enterprise)
3.	Application Number – from AIA document G702	23.	Brief description of work each sub will perform. (Roofing, HVAC, trash removal, consulting, etc)
4.	Application Date is same date as on draw application	24.	List project value total contracted with each sub-contractor / sub-consultant
5.	Reporting Period – from AIA document G702 "From: To:"	25.	This month's draw amount for each sub-contractor/ sub-consultant
6.	SBE Goal as set by the prime contractor for this project as applicable	26.	To date total billed to each sub-contractor / sub-consultant. The total amount summation must equal the % value listed in box number 17
7.	Scheduled Completion date for your project per the approved contract or approved change order	27.	Start date for each sub-contractor / sub-consultant contract
8. – 10.	Business name of prime contractor – phone & fax	28.	Scheduled completion date for each sub-contractor / sub-consultant contract
11.	Prime contractor mailing address		
12.-14.	Project Manager's name - phone & fax		
15.	Amount of contract including original contract amount, change orders and approved alternatives	NOTE:	
16.	The total of this draw or invoice as authorized on the AIA document G702	1.	This form must be submitted with every pay application
17.	Percentage of project completed to this date by SBE Sub-contractor/Sub-consultant (Total SBE from Box 26 divided by Box 15)	2.	You must submit the partial release of liens with the pay application
18.	The total amount invoiced on this project to date	3.	You must have a copy of the SBE certification for <u>every</u> certified SBE sub-contractor/ sub-consultant on the job
19.	Total percentage of project completed to date	4.	If no SBE for reporting period is required, check the box indicating: "Note: SBE reporting for this pay period not applicable"
20.	Federal Identification Number	5.	<u>This form must be notarized for each pay application or invoice submitted. The pay application can not be processed without this required certification</u>

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FORT BEND INDEPENDENT SCHOOL DISTRICT

SUB-CONTRACTORS/SUB-CONSULTANTS/SUPPLIERS PAYMENT CERTIFICATION FORM

- Instructions:**
1. This form shall be completed and signed by an officer of the Sub-contractor's/Sub-consultant's company for each payment received from the Prime Contractor and shall be returned to the Prime Contractor for its submission to FBISD.
 2. The Prime Contractor shall attach this completed form to each application for payment submitted to FBISD.

PROJECT NO./TITLE: _____

NAME OF SUB-CONTRACTOR: _____

ADDRESS: _____

I hereby certify that the above firm has received payment on _____ from _____
(Date) (Prime Contractor)

in the amount of \$ _____ as full payment of our Invoice No. _____ dated _____

for work performed during _____ under Contract/Project No. _____
(Enter Time Period)

Signature: _____

Name (Print or Type): _____

Title: _____

Date: _____

Telephone: _____

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DIVISION 1 – GENERAL REQUIREMENTS
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. These documents are to be uploaded into the Owners designated software (Kahua/ Kahua):
 - 1. PDF electronic file. Submit and upload into owner's designated software.
- B. Daily Construction Reports: GC to submit Daily Construction Reports. These reports are to inform the Owner and Owner's Program Manager the progress of the work being performed and work being completed. The GC shall report known deviations from the Contract Documents, any defects and deficiencies observed in the work. Reports and any required supporting documents such as photographs, test reports, etc. must be submitted in Owner designated Software.
- C. Material and Equipment Delivery Status Reports: Submit at weekly construction progress meetings.
- D. Request For Information (RFI): Submit at time of discovery of differing conditions.
- E. Special Reports: Submit at time of unusual event

PART 2 PRODUCTS

2.1 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report using the Owners designated software (Kahua/ Kahua) 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, adverse weather conditions, high winds, impending tropical storms, or hurricanes.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 00 Construction Progress Documentation

6. Accidents.
 7. Meetings and significant decisions.
 8. Defects and Deficiencies
 9. Photographs
 10. Test Reports
 11. Unusual events (refer to special reports).
 12. Stoppages, delays, shortages, and losses.
 13. Meter readings and similar recordings.
 14. Emergency procedures.
 15. Orders and requests of authorities having jurisdiction.
 16. Change Orders received and implemented.
 17. Construction Change Directives received and implemented.
 18. Services connected and disconnected.
 19. Equipment or system tests and startups.
 20. Partial completions and occupancies.
 21. Substantial Completions authorized.
- B. Material and Equipment Delivery Status Reports: Weekly 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

PART 1 GENERAL

1.1 Description

- A. Section includes administrative and procedural requirements for developing, submitting and updating a Critical Path Method (CPM) schedule.

1.2 Quality Control and Quality Assurance

- A. The Contractor shall develop and maintain a Project Schedule for each project site (School) 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, architect 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 interdependencies 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 that utilizes the fundamentals of CPM for scheduling. New schools or projects with a value of \$5M dollars or more will be required to use P6 scheduling. A variance can be given by owner's representative if requested in writing prior to the NTP.
- C. New schools or projects of \$5M or more: Within seven (7) calendar days after issuance of Notice to Proceed unless otherwise noted the Contractor shall designate in writing a schedule representative 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

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- representative shall have complete authority to act for the Contractor in fulfilling the schedule requirements of the Contract.
- 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. With the exception of the specified contract substantial completion milestone, the contractor shall not use any constraints of any type without prior approval of the Owner.
 - F. The Baseline Schedule project substantial completion milestone for each campus shall be assigned a “Finish on or Before” constraint. The required contract finish date shall be assigned to track project delivery related to contract requirements. The progress schedule submitted shall not have any constraints without approval from the owner.
 - G. Each activity’s “Activity ID” and “Activity Description” or “Task Name” shall remain unchanged throughout the duration of the project, subsequent to the acceptance by the Owner.
 - H. 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.
 - I. PM acceptance shall be obtained prior to making any changes or revisions to an activity’s “Activity Description”.

1.3 Submittals

- A. All CPM Schedules (preliminary and baseline) shall be presented submitted per specification 01 33 00 at review meeting.. One electronic copy in pdf and an accessible format not pdf to be uploaded to Kahua per submittal procedures 01 33 00. The substantial completion date in the detailed CPM schedule shall coincide with the substantial completion date on the contract.
- B. Schedule Update: The Contractor shall submit with every payment application a copy of the approved baseline CPM Schedule with a narrative of the progress or delay of scheduled activities.
- C. Recovery or Revision to the CPM Schedule: The Contractor shall provide a Recovery CPM Schedule within seven (7) calendar days of any CPM schedule update meeting or at the request of the architect or owner’s representative. A recovery schedule to the baseline will be requested if any milestone, completion date or end of Period Performance falls seven (7) calendar days or greater behind scheduled completion of the activity on the CPM schedule(negative float).

PART 2 PRELIMINARY CPM SCHEDULE

2.1 Preliminary CPM Schedule

- A. The preliminary CPM schedule will be delivered to the owner’s representative and architect within three (3) days of NTP. The preliminary CPM Schedule shall be the basis for the sequence of work during the first sixty (60) calendar days of the Contract while the Project Schedule is being developed, submitted, reviewed and accepted. If the acceptance of the Project baseline CPM Schedule

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

extends beyond sixty (60) days, the Preliminary CPM Schedule shall be updated according to the requirements stated in paragraph 3.3.

2.2 Schedule Review and Acceptance

- A. The PM, Architect/Engineer and the Contractor shall meet within seven (7) calendar days of receipt of any CPM Schedule for joint review. The Contractor shall revise any areas, which, in the opinion of the owner's representative 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 owner's representative review does not detect this omission or error, such omission or error, when discovered by the Contractor, architect or the owner's representative, shall be corrected by the Contractor.
- B. Within seven (7) calendar days after the joint review between the architect, contractor and the owner's representative, the Contractor shall revise the CPM Schedule in accordance with agreements reached during the joint review and submit the revised schedule as project CPM schedule per the deliverable requirements.
- C. Acceptance of the CPM project schedule by the architect and owner's representative 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.
- D. Submission and final acceptance by architect and owner's representative of the 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 owner's representative shall notify the contractor of the Owner's acceptance of the CPM Schedule in writing.

PART 3 PROJECT CPM SCHEDULE

3.1 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 baseline project schedule shall indicate a logical sequence of work for each project site (school). 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 interdependencies of activities required for complete performance of the Work.

Proposed durations assigned to each activity shall not exceed ten (10) days unless approved by owner's representative in writing. In developing the baseline 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

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 and submit for approval to architect and owner's representative. Under no circumstance or event, shall a schedule modification or revision under this paragraph extend a milestone. The baseline 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 architect and the owner's representative.

- B. Provide sufficient detail and clarity of form and technique so that all work can be properly controlled and progress monitored by the owner's representative and architect. 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 baseline 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 CPM Schedule. Add column for responsible party (i.e. owner, subcontractor trade, 3rd party, etc.) 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 on a monthly basis. In addition, activities of similar nature shall be assigned to independent calendars based on this weather data. Contractor to provide a Weather Log each month as part of their Schedule Submittal.
 5. Activity duration in whole working days with a maximum duration of ten (10) working days each, unless otherwise approved by the owner's representative, except for non-construction activities including mobilization, procurement and concrete curing activities.
 6. For projects where hazardous materials are present and require abatement by the Owner, such abatement activities may take place prior to the Contractor's mobilization and start of any work or they may take place concurrently with the Contractor's work. In cases where abatement activities must take place concurrently with Contractor's work, the Contractor shall

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

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- allow for these activities to be incorporated into the Project CPM Schedule as separate activity line items. The Contractor shall allow time for these activities to take place at the appropriate time within the project schedule and shall coordinate their work with such abatement activities.
7. At a minimum, the following guidelines, intermediate and final milestones shall be included in the project schedules for each individual project site (school)-
- 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. CPM Schedule submission and acceptance
 - f. Building dry-in
 - g. Permanent power
 - h. Conditioned air available
 - i. Completed testing and acceptance of Life Safety Systems and other critical building components
 - j. Completion of ADA upgrades in restrooms
 - k. Commissioning, when project requires
 - l. Building Flush out, 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. The narrative shall elaborate on the basis for durations, major equipment to be used, calendars utilized, activity coding applied, smart ID descriptions and 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 baselined project schedule.
- D. Deliverable: Within fourteen (14) calendar days after the Notice to Proceed, the project CPM schedule deliverable will be submitted by the Contractor and uploaded to Kahua shall include the following:
1. Two (2) copies (preferably 11 x 17) of the project schedule delivered at the review meeting. The critical path shall be readily discernible in red ink.
 2. Two (2) copies of the written narrative as described in paragraph 3.1.C.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

3. One (1) electronic copy in pdf and an accessible format, not pdf, to be uploaded to Kahua per 01 33 00.

3.2 Schedule Review and Acceptance

- A. The architect, owner's representative, and the Contractor shall meet within seven (7) calendar days of submitted CPM project schedule on a date selected by the owner's representative and agreed upon by all. The meeting will be to discuss review the submitted project schedule. If a revision or justification is requested, the Contractor shall re-submit the proposed project schedule within seven (7) calendar days and address all issues to the satisfaction of the architect or owner's representative. Any and all disagreements or interpretations of the meaning or intent of this specification shall be solely dictated by the Owner.
- B. The architect, owner's representative and the Contractor shall meet within seven (7) calendar days of receipt of the Contractor's response, if needed, to review, corrections or adjustments of the Contractor's proposed project schedule. Any area, in the opinion of the architect and/or owner's representative, conflicts with timely completion of the project, shall be subject to revision by the Contractor.
- C. Within seven (7) calendar days after the joint review meeting and no acceptance of the project schedule, the Contractor shall incorporate revisions as directed by the architect and owner's representative and re-submit the proposed project schedule per the deliverable requirement as stated in paragraph 3.1.D. All further review by the architect and owner's representative and shall be within seven (7) calendar days of receipt of revised schedule by the contractor. This will continue until the architect and owner's representative are satisfied.
- D. The owner's representative shall notify the Contractor in writing of final acceptance of the Contractor's Project Schedule using submittal approval procedures stated in section 01 33 00 and the project schedule will become baseline for the project. The baseline schedule will not be changed through the life of the project unless requested by owner or owner's representative in writing.
- E. In the event the Contractor fails to define any element of work, activity or logic in the project schedule during the review and the owner or owner's representative 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. 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.

3.3 Schedule Updates

- A. After the Project Schedule is accepted by the architect and owner's representative and the Contractor, it shall be "baselined" and used as a comparison for future progress updates.
- B. If the Contractor's schedule reflects or the architect and/or owner's representative 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

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 Owner. A narrative indicating the revised approach to schedule recovery is to accompany the recovery schedule submittal. The revised or recovery schedule shall be in accordance to paragraph 1.3.B.

- C. Out-of-Sequence progress logic shall be reviewed by the contractor's scheduler and corrected before submitting the progress update.
- D. The percentage of all work shall be calculated by estimating the actual remaining duration time for each progressed activity. The data date of each schedule update shall be determined by the owner's representative. Contractor prepared estimates of the percent completion of each scheduled activity and the necessary supporting data shall be submitted.
 - 1. One (1) original baseline schedule indicating actual activity start and/or finish dates and revised (current) remaining durations.
 - 2. A narrative report shall be included that indicates in writing those activities the Contractor knows to be seven (7) days beyond the baseline schedule completion date 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 Contractor's method of correction. Any additional written information necessary to support the updated schedule including explanations of revisions to activities: logic, durations, resources, etc.
- E. In case of disagreements at the project progress meeting concerning actual progress to date, the Owner or owner's representative 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.
- F. Each Schedule Update shall be forwarded to the architect and owner's representative using the owner's project management software per section 1.3.A of this specification within seven (7) calendar days after the schedule update meeting and shall include a narrative report with the following information:
 - 1. Activities that have been added to the project schedule update.
 - 2. Activities that have been deleted from 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

6. One (1) electronic copy 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 uploaded to Kahua per 1.3.A of this specifications.
7. One (1) electronic pdf format written narrative as described in paragraph 3.3.F and uploaded to Kahua with the updated schedule.
8. One (1) native “xer” electronic file with the native updated schedule for the owner’s review. Transmittal by Email to the PM with a transmittal cover sheet uploaded to Kahua with the schedule pay application files.
9. A list of all days occurring for the life of the project that may have impacted the schedule. Determination on the validity of the impact will be established at the recovery schedule meeting. If all parties cannot agree the owner’s representative’s determination shall govern.

3.4 Revisions to the Project Schedule

- A. 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 the architect and owner’s representative in writing, stating the reason for the proposed revision. If revision to the schedule is contemplated, the architect or owner’s representative shall so advise the other in writing at least seven (7) calendar days. A schedule update meeting will be requested by the contractor describing the revision and setting forth the reasons thereof.

3.5 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.

3.6 Impact Analysis for Change Orders, Delays, and Contractor Requests:

- A. When changes are initiated or the Contractor desires to revise the project schedule, the contractor shall submit to the architect and owner’s representative a narrative explaining the time impact to the project. The narrative will be sent to the architect and owner’s representative via transmittal from Kahua and a schedule review meeting will be scheduled within seven (7) days or at the convenience of the architect and owner’s representative.
- B. Activity delays shall not automatically mean that an extension of time 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 16 Construction Progress Schedule

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- 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 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 will be made by the architect and/or the owner's representative. Recommendations shall be made within seven (7) calendar days after a schedule review meeting has taken place, unless subsequent meetings or negotiations are necessary. After a decision has been made by the Owner an acceptance notification will be sent by the owner via change order with approved time if accepted. All approved changes shall be incorporated into the baselined schedule prior to the next pay application by the contractor.

End of Section 01 32 16

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DIVISION 1 – GENERAL REQUIREMENTS
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. Periodic construction video recordings.
 - 5. Owner designated software
- B. Related Sections:
 - 1. Division 01 Section "Unit Prices" for procedures for unit prices for extra photographs.
 - 2. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
 - 3. Division 01 Section "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
 - 4. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
 - 5. Division 02 Section "Structure Demolition" for photographic documentation before building demolition operations commences.
 - 6. Division 02 Section "Selective Structure Demolition" for photographic documentation before selective demolition operations commence.
 - 7. Division 31 Section "Site Clearing" for photographic documentation before site clearing operations commence.

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 10 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 of Contractor.
 - c. Date photograph was taken.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 32 33 - Photographic Documentation

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- d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - e. Unique sequential identifier keyed to accompanying key plan.
 - C. Construction Photographs: The project requires comprehensive documentation of construction progress and post inspection milestones. Submit electronic copies of each photographic view in the quantities and at the intervals described in paragraph 3.1 of this Section.
 - 1. "Progression" photo sets are to be performed at periodic intervals throughout the duration of construction, as applicable to the scope and as follows:
 - a. Site survey (Pre-construction): A one-time shot that provides coverage of site and immediate surroundings.
 - b. Interior progression shots: Broadly track the improvements from logical perspectives, to be performed at regular intervals and coordinated with pace of erection.
 - c. 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 electronic format.
 - 2. Identification: With each submittal, provide the following information:
 - a. Name of Project.
 - b. Name of Contractor.
 - c. Date recording was recorded.
 - d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - e. Weather conditions at time of recording.
- 1.4 QUALITY ASSURANCE
- A. Photographer Qualifications: An individual who has the basic skills necessary to record digital photographs and electronic recordings.
- 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 if necessary 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 10 mega pixels.
- B. Digital Video Recordings: Provide high-resolution, digital video recordings.

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. 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 in file name for each image.
- C. Preconstruction 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.
- D. Periodic Construction Photographs: Take photographs and submit with daily field report in Kahua. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: Take a minimum of 20 color photographs after date of Substantial Completion for submission as project record documents.

3.2 CONSTRUCTION VIDEO RECORDINGS

- A. Owner's Training: Record video during the manufacturer's training session. Deliver the recordings with the O&M Manual(s).
- B. Submit videos in electronic format on flash drives. Label all videos according to the equipment the training is about.

End of Section 01 32 33

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DIVISION 1 – GENERAL REQUIREMENTS

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 but not limited to:
 - 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 "Project Management and Coordination" key personnel.
 - 4. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 5. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 6. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 7. 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. Shop-work manufacturing instructions.
 - 4. Templates.
 - 5. Patterns.
 - 6. Coordination drawings (for use on-site).
 - 7. Schedules.
 - 8. Design mix formulas.
 - 9. Contractor's engineering calculations.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 33 00 Submittal Procedures

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- 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. LEED specific information (as applicable)
 10. 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 33 00 Submittal Procedures

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's and/or Contractor'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 may or may 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. Submittal schedule will be delivered by contractor within 7 days of NTP.
 - 1. Coordinate submittal schedule with list of subcontracts and Contractor's construction schedule.
 - 2. Submit revised submittal schedule monthly to reflect changes in current status and timing for submittals.
 - 3. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: i.e. Action, informational, shop drawing.
 - 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. Contractor must process Submittals using the Owners designated software (Kahua).
- B. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings. Architect will use transmittal in owner's

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- designated software to record distribution of CAD drawings or other electronic files.
- a. Digital Drawing Software Program: The Contract Drawings may be in AUTOCAD format.
- C. 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. Coordination/ approval of certain submittals may be required by either owner or owner designated consultants.
- D. 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 14 calendar 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.
- E. 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

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- 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.
- F. 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 as applicable:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
 - j. Location(s) where product is to be installed, as appropriate.
 - k. Related physical samples submitted directly.
 - l. Other necessary identification.
 - 5. Include the following information as keywords in the electronic file metadata:
 - a. Project name.

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- b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
 - G. Options: Identify options requiring selection by the Architect.
 - H. Deviations: Identify deviations from the Contract Documents on submittals.
 - I. Transmittal: Assemble each submittal individually and upload to owner's designated software. Use submittal procedures to direct submittals to the party or parties responsible for review and approval of submittal. Reviewers will return submittals using the owner's designated software submittal reviewer procedure.
 - J. Resubmittals: Make resubmittals in same form as initial submittal and use owner's designated software submittal procedure.
 - 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.
 - K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities.
 - L. 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 within the Owners designated software
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Submit electronic submittals via the Owners designated software 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 informational submittal with request for Architect to review action submittal and provide date and time for event.
 - a. Create individual action submittal using owner's designated software. Provide cover page per section F.4. Provide pictures, copies of emails or other proof Architect and contractor have reviewed action submittal.
 - 4. Informational Submittals: submit as PDF electronic files directly to the appropriate location within the Owners designated software.

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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.
 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.
- 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 requirements.
 - e. Notation of dimensions established by field measurement.

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- 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:
 - h. PDF electronic file.
 - i. Primitive native file if requested by architect or owner.
 - 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. Architect to approve sample size.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain one with option to provide owner a sample; 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.

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Section 01 33 00 Submittal Procedures

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- 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. 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.
 - b. Number of Copies: Three paper copies of subcontractor list, unless otherwise indicated. Architect will return two copies.
- F. Qualification Data: Prepare written in pdf format information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, and other information specified.
- G. Welding Certificates: Prepare written in pdf format 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.
- H. Installer Certificates: Submit written in pdf format 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.
- I. Manufacturer Certificates: Submit written in pdf format statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- J. Product Certificates: Submit written in pdf format statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- K. Material Certificates: Submit written in pdf format statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- L. Material Test Reports: Submit reports in pdf format 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.
- M. Product Test Reports: Submit written reports in pdf format indicating current product produced by manufacturer complies with requirements in

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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.

- N. Research Reports: Submit written in pdf format 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.
- O. Preconstruction Test Reports: Submit reports written in pdf format 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.
- P. Compatibility Test Reports: Submit reports written in pdf format 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.
- Q. Field Test Reports: Submit reports in pdf format 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. Submit reports in owner's designated software
- R. As pdf file upload in owner's designated software with daily report for the work by contractor.
- S. Design Data: Prepare and submit written in pdf format 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

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 using owner's designated software in RFI module.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit in pdf format a copy of certificate, signed and sealed by the responsible design professional,

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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. 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 the status of the submittal.
- C. Informational Submittals: Architect will review each submittal. Architect will upload each submittal to owner's designated software in the RFI module following the reviewer procedure.
- D. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review. Architect will notify contractor through owner's designated software via the RFI module or via email the submittal is incomplete.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
- F. Submittals that are required per contract agreements may be reviewed and approved by owner or owner's representative.

End of Section 01 31 00

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DIVISION 1 – GENERAL REQUIREMENTS
Section 01 35 23 Project Safety and Loss Prevention

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, FBISD Safety Program Guidelines Manual, apply to this Section.

1.2 CONSTRUCTION SAFETY AND LOSS CONTROL PROGRAM

- A. Contractor, along with the Subcontractors of all tiers, shall develop a composite Safety Program. The safety plan establishes minimum standards of performance regarding safety during the course of the work on the project. The prevention of job-related injuries and illnesses may require additional safety devices and/or procedures beyond these minimum standards. This Safety Program will include enforcement of safe practices, instructions, and direction in the use of safety equipment and personal protective equipment, and other such activities as may be necessary and appropriate to maintain job safety and accident prevention. A copy of the site-specific plan shall be submitted to the FBISD Project Manager for review prior to starting work onsite following submittal procedures outlined in 01 33 00.
- B. Implementation and enforcement of the Safety and Loss Prevention Program for the work force of Contractor and all Subcontractors shall be responsibility of Contractor. Owner or representatives of the owner may conduct periodic jobsite safety inspections to monitor compliance with the Safety and Loss Prevention Program. If Contractor activities are not in compliance with their Safety and Loss Prevention Program, Owner or owner's representative will inform the Contractor in writing of the observed noncompliance, or safety hazards using owner's designated software. These items must be corrected in a timely manner. If the Contractor fails to correct any safety non-compliance or hazard, the Owner shall have the right but not the obligation to perform the correction action and withhold costs associated with the corrective action from the Contractors next or final payment. The owner or owner's representative reserve the right to shut down the job until corrections have been initiated and documented.
- C. It is not the intent of this Contract to require the Owner, to provide services, assume responsibility or accept liability for the safety of work sites or any aspect of the work by Contractors or Subcontractors. Each contractor shall bear sole and exclusive responsibility for safety in all phases of their work. Nothing contained herein shall relieve such responsibility.
- D. The Owner's role in achieving construction safety and health objectives include overall supervisory management for site safety. This responsibility does not supersede, override or take precedence over that of construction Contractors, who are ultimately responsible for the safety and health of their employees, Subcontractors, visitors, students, staff, the public and protection of property. The primary functions of the Owner as it relates to construction safety and health are to monitor Contractor compliance with the safety and health standards required by law and to

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Section 01 35 23 Project Safety and Loss Prevention

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- administer and enforce the conditions of the contract pertaining to safety, health, and security.
- E. Each Contractor and Subcontractor shall comply with all applicable safety related laws, including the following:
1. Walsh-Healy Public Contracts Act 9 (Title 41 CFR, Part 50-2-3) and the included rules and regulations contained in the Occupational Safety and Health Standards, and Established Federal Standards (Title 20 CFR, Part 1910 and CFR, Part 1926).
 2. U.S. Department of Transportation Safety Requirements – Federal Highway Projects, 1968, including the requirements referred to in Appendix A therein.
 3. State and local codes and regulations.
- F. Safety Documentation Reporting: Contractor shall submit to Owner and owner's representative the following reports upon request:
1. All accident investigation reports shall be submitted no more than 24 hours after occurrence. The Contractor must maintain accurate records of personal injury and property loss, cooperate and aid in investigation of cases, and implement appropriate actions to prevent recurrence. Owner's representative shall be notified immediately following all accidents.
 2. A binder shall be maintained on site documenting safety orientation of new hire employees and shall be submitted when requested.
 3. Weekly Contractor-held safety meeting reports shall be logged in a binder on site and submitted upon request.
 4. Weekly site safety inspection reports performed by Contractor shall be logged in a binder on site weekly.
 5. Safe Plans of Action (SPA) shall be completed by the contractor prior to each task if required by loss and safety prevention plans and submitted upon request.
 6. Task Safety Awareness (TSA) meeting documents shall be maintained by the contractor if required by loss and safety prevention plans for review by the FBISD Project Manager upon request.
 7. A summary log of all accidents and injuries including first-aid treatments is to be maintained on site and submitted upon request.
 8. Crane re-certifications on an occurrence basis and proof of certification prior to beginning work shall be maintained in a log on site and submitted upon request.
 9. A Job Safety Analysis (JSA) shall be performed, signed off by all crewmembers, job superintendent; and Contractors competent person prior to all lifting activities using any means.
 10. Crane Safety – all crane operations will require a JSA for all hoisting operations; copy of the crane lift chart marked with longest and heaviest lifts; all crew members to sign off on JSA; barricade tape around crane at all times; need crane crew to

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Section 01 35 23 Project Safety and Loss Prevention

indicate on a copy of the crane's lift chart where the highest and heaviest pick is located; tail swing location, etc.

11. A summary of contractor's OSHA Safety Violations and Citations for the site will be submitted to owner or owner's representative 4 working days prior to the opening Inspection Conference.
12. A notice of work termination shall be submitted via transmittal in owner's software to owner or owner's representative by the Contractor within 10 calendar days of a Subcontractor completing work under its Contract and leaving the jobsite.
13. A site-specific safety plan must be submitted via submittal procedure 01 33 00 within thirty (30) days of NTP. The final site-specific safety plan must be accepted by Owner prior to approval of first pay application.
14. Name and qualifications of an on-site safety person will be documented within the site-specific safety plan prior to approval of plan.
15. List of Hazardous Substances brought on site and SDS for each item.
16. Copy of OSHA 300 log for their project.
17. Accident and injury reports within 24 hours of occurrence.

1.3 SITE SAFETY DEVICES

- A. Contractor and its Subcontractors performing work at project site maintain responsibility for providing all safety related equipment such as, but not limited to, testing equipment, safety valving, chains, locks, alarms, signal, signage, and personal protective equipment necessary to protect site workers, students, staff, and the general public.
- B. Employees on walking and/or working surfaces with unprotected sides or edges six feet (6') or higher above a lower level shall be protected from falling by the use of guardrails, nets or personal fall arrest systems. This shall include, but is not limited to employees on the face of formwork, reinforcing steel or structural steel during and after erection, exterior and interior masonry work, roofing work, window installation, electrical work, mechanical work, and all other trades that require crafts/workers to work in areas where the height exceeds six feet (6') above the ground or work surface.
- C. One hundred percent (100%) personal eye wear and head wear protection is required in all construction work areas and shall be worn at all times by employees of both the contractor and subcontractors (regardless of subcontractor tier). Protective eye wear shall conform and meet requirements stated in ANSI Z87.1-1968.
- D. Clean-Up and Waste Disposal. Contractor shall perform a daily site cleanup and otherwise keep the Project Site free from accumulation of waste materials, rubbish and other debris resulting from the performance of the Work. The Contractor shall also be responsible for providing mowing / grass cutting services for areas inside of the construction areas weekly. Contractor shall, in compliance with Applicable Laws, remove, transport, and dispose of any Hazardous Substance transported onto the Project Site by or on behalf of Contractor or any Subcontractor's activities

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at the Project Site. Contractor shall notify the Project Company immediately upon the discovery of the presence of any Hazardous Substance on, or the release of any set forth above, Contractor shall not be responsible for the transportation, handling, storage or removal of any Hazardous Substances which existed at, on or in the Project Site prior to commencement by Contractor of the Work.

1.4 RESPONSIBILITY

- A. Each participant involved in the construction of the project is individually responsible for conducting their activities to ensure compliance with all applicable project safety and health requirements. The owner and owner's representative are on site as observers and will help to monitor the approved contractor's loss and safety prevention plan and enforce federal, state, and local regulations or codes. The Contractor and the Contractor's Site Safety Manager is responsible for detailed monitoring of construction activities.

1.5 CONTRACTOR SITE SAFETY MANAGER RESPONSIBILITIES

- A. The Contractor's Site Safety Manager is responsible for implementing the safety and health plan at the project level. The following specific safety and health plan guide will be followed:
1. Pre-plan work activities through the use of Safe Plans of Action (SPA) in order to identify and control and safety and health issues, which may pose a hazard to employees or others.
 2. Contractors are responsible for completing Safe Plans of Action (SPA) and communicating them to employees prior to beginning each work task. This communication of safe work practices will be documented through the Task Safety Awareness meeting and form.
 3. Establish and maintain a safe and healthy work environment by adhering to the guidelines and procedures issued in the latest document of the Federal, State, local code, and site-specific requirements.
 4. Ensure that all Contractor employees and Subcontractors implement and abide by the safety, health, and security rules and regulations set forth by all regulatory agencies as well as those established by this plan.
 5. Hold, at minimum, weekly meetings with Subcontractors to discuss accident prevention measures, review any accident prevention measures, review any accidents which might have occurred since the last meeting, and institute any additional safety measures necessary to prevent future accidents. Meetings will include incidents, which may pose potential third party claim exposures to the District.
 6. Assure that Owner's staff is knowledgeable of all Contractor Subcontractor safety and health programs. The safety manager will give special attention to those operations, which require a coordinated effort by the Contractor and Owner.
 7. Maintain open and continuing communications between the Owner and the Contractors on safety and health issues.

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8. Assure that the safety program general requirements apply to visitors entering the project sites. A visitor's log will be established and maintained at each project.
 9. Arrange for specific job safety training for Owner's staff members using or operating special equipment or entering confined spaces and/or the use of other personal protective equipment or other analysis instruments.
 10. Require the Contractor personnel complete a thorough investigation of all accidents, occurrences. Reports shall be completed and submitted to the FBISD Project Manager within 24 hours after the occurrences.
 11. Assure that safety is the FIRST subject of EVERY Contractor/Subcontractor meeting.
 12. Review all safety inspection reports with the Subcontractors during the weekly progress meeting.
 13. Prior to the construction activity by any Contractor and/or Subcontractor the Safety Manager will assure that all pre-work job safety analysis submittals have been reviewed.
 14. Verify the Contractor has no outstanding safety deficiencies that could result in the delay of payment.
 15. Assign and manage additional Contractor safety personnel as warranted.
 16. Conduct weekly Contractor safety records and performance audits.
 17. Attend safety training sessions as required by the Owner.

1.6 OWNER'S RESPONSIBILITIES

- A. Review Contractors/Subcontractors safety plan.
- B. Make recommendations for administrative action when Contractors fail to correctly identify safety, health, or environmental deficiencies.
- C. Attend Contractor/Subcontractor toolbox safety meetings as deemed necessary.

1.7 CONTRACTOR SITE SAFETY SUPERINTENDENT (for projects exceeding \$10 million dollars)

- A. The Contractor shall appoint a Competent Site Safety Superintendent. The site safety superintendent may have other responsibilities on the project. Contactor shall submit, in writing, the name and qualifications of the proposed individual to serve as Site Safety Superintendent to FBISD for approval, prior to beginning work. The Site Safety Superintendent shall be qualified to serve in this capacity and shall not be changed without written notice to the FBISD Project Manager. All employee substitutions into this position must be approved by the FBISD Project Manager. The Owner shall have right to require removal of the Site Safety Superintendent should he/she be deemed incompetent, obstructive or ineffective in carrying out the work.
- B. The Site Safety Superintendent employed by the Contractor shall have full authority to act and make decisions for the Contractor in safety and loss control related matters.
- C. The Contractor's Site Safety Superintendent shall monitor all work to assure that it is being performed in accordance with the requirements of

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the Safety Program and site specific Contactor Safety Program. This person shall be present at the work site during regular and other work hours acting the capacity of Site Safety Superintendent.

D. Smoking shall be prohibited on all FBISD jobsites

1.8 SAFETY

A. Conduct weekly safety sessions.

B. Attendance: Mandatory for superintendent and foreman for Contractor and each Subcontractor.

End of Section 01 35 23

DIVISION 1 – GENERAL REQUIREMENTS

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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. Testing and Inspection documentation should be generated using the Owner's designated software.
- 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, 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" (TAB provided by owner)

1.3 DEFINITIONS

- A. 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.

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- B. 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.
 - C. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
 - D. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
 - E. Testing Agency: An entity engaged by the Owner to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
 - F. 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.
 - G. 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 INFORMATIONAL SUBMITTALS

- A. 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.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following, as applicable:
 - 1. Specification Section number and title.

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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.

1.6 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 re-inspection.
- 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.

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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.

1.7 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. 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.
- G. 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

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products that are similar in material, design, and extent to those indicated for this Project.

- H. 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.

1.8 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 re-inspection of 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:

1. 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.

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- 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.
 2. 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.
 3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 4. 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 pre-installation 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/Re-inspection: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspection, for construction that replaced Work that failed to comply with the Contract Documents.
 - F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of

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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.
- G. 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, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 EXECUTION

2.1 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 reference during normal working hours. Provide a copy of the log at completion of the project upon request of Architect, owner or owner's representative.

2.2 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

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DIVISION 1 – GENERAL REQUIREMENTS

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 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized", "selected", "required", and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown", "noted", "scheduled", and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

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Section 01 42 00 References

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- J. “Testing Agencies”: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and , if required, to interpret results of those inspections or tests.

1.4 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.

1.5 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

1.6 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

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Section 01 42 00 References

conjunction with compliance with standards and regulations bearing upon performance of the Work. Submit all applicable records via transmittal using owner designated software.

End of Section 01 42 00

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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 are the responsibility of the Contractor. Contractors performing renovation work or additions to existing campuses may request a variance on usage to be delivered in writing from the owner or owner's representative via email. 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.
 - 2. Temporary electric power and light.
 - 3. Telephone service.
 - 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 new construction and additions to existing campuses include but are not limited to the following:
 - 1. Temporary heat.
 - 2. Field offices and storage sheds.
 - 3. Sanitary facilities, including drinking water, handwashing.
 - 4. Dewatering facilities and drains.
 - 5. Temporary enclosures.
 - 6. First aid station, including eye wash 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 owner's representative.
- C. Security and protection facilities and services required for Project include but are not limited to the following:

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Section 01 50 00 Temporary Facilities and Controls

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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 and owner's representative.
 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 which 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.
 9. Barrier requirements for minor renovation work will be discussed and agreed upon at weekly progress meetings.

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.
- B. Sewer Service: Owner will pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.5 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, temporary barricades, site entrance, utility hookups, staging areas, and parking areas for construction personnel. Submit for approval within 7 days of NTP by Architect/Engineer and/or owner's representative using specification 01 33 00 submittal procedures.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent. Submit for information to Architect/Engineer and/or owner's representative using specification 01 33 00 submittal procedures.
- 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. Submit for

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information to Architect/Engineer and/or owner's representative using specification 01 33 00 submittal procedures.

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. Submit for approval by Architect/Engineer and/or owner's representative using specification 01 33 00 submittal procedures. 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. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", as prepared jointly by QUOIN and ASC for industry recommendations.
- D. Inspections: Inspect and test each service before placing temporary utilities in use. Arrange for required inspections and tests by governing authorities, and obtain required certifications, and permits for use.
- E. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

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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 or 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 owner's representative regarding permission for the use of selected areas of 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. The projects requiring new paved entries, parking lots, or other paving work in excess of 10,000 square feet will consider the work to be critical path. A phasing schedule for installation will be submitted by contractor within seven (7) days of NTP for review by Architect/Engineer and/or owner's representative using the owner's designated software via a transmittal.

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 and/or owner's representative. Provide only materials

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- 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

Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

- A. 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.
 - 2. Conference room of sufficient size to accommodate meetings of 8 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table that will seat 10 attendees, chairs, and 4-foot-square tack and marker boards.
 - 3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 4. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- B. 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.
- C. Temporary Construction and Support Facilities: Provide facilities that can be maintained properly throughout their use at the Project site.
- D. 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

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similar non-absorbent material. Provide at least one for every thirty (20) employees.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures. Provide quantity and type to comply with all local, state, and federal safety codes.
- 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. All return grilles will be replaced upon completion of project if used during 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."
- 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 better than or equal to existing before initial use. If services do not exist Contractor shall provide.
- 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.

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- 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. Cover all supply and return grills left in place with plastic to prevent dust intrusion.
 - c. 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.
 - 4. Fire alarm system may be required to be put in test mode temporarily, if site conditions warrants it.
- 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 if available with written permission from owner or owner's representative. 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 for new construction projects.
- 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.
 - 2. Install lighting for Project identification sign.

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- J. Telephone Service: Provide Wi-Fi service in common-use facilities for use by contractor, architect, owner and owner's representative. Passwords will be provided at first OAC meeting following installation and setup of Wi-Fi system.
 - 1. Provide superintendent and other contractor management staff with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction 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 five (5) designated, accessible, and secure parking spaces nearest to the project or job trailer for the A/E, owner, and/or owner's representative. 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 inform the public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - b. Provide warning signs to students, staff, pedestrians, visitors and others for any closed or impeded paths to access and egress in or around the immediate site.
 - 3. Maintain and touchup signs so they are legible at all times.
 - 4. No other signs shall be allowed on site with the exception of those that are safety oriented. No signs serving as advertisement shall be allowed.
- 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

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- 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 better than or equal 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. Provide coordination drawings when applicable with locations of proposed areas to A/E and/or owner's representative via transmittal in owners designated software.
 - 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. Provide coordination drawings when applicable with locations of proposed areas to Architect and/or owner's representative via transmittal in owners designated software.
 - 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.

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Section 01 50 00 Temporary Facilities and Controls

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- 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 5. Protect air-handling equipment.
 - 6. 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. Provide coordination drawings when applicable with locations of proposed areas to Architect and/or owner's representative via transmittal in Kahua .
 - 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.
 - C. Any new construction materials with visible moisture damage or mold contamination will be removed from the project and replaced at contractors cost.
 - D. Any existing surfaces suffering moisture damage or mold contamination during construction will be the responsibility of the contractor. Surfaces will be cleaned, replaced, or remediated to owner's satisfaction.
- 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.

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Section 01 50 00 Temporary Facilities and Controls

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- C. 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.
 - D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
 - E. 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.

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."

End of Section 01 50 00

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DIVISION 1 – GENERAL REQUIREMENTS

Section 01 55 26 Traffic Control

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements for signs, signals, control devices, traffic barriers, flares, lights and traffic signals; construction parking control, designated haul routes, and bridging of trenches and excavations.
- B. Qualifications and requirements for use of flagmen.

1.2 MEASUREMENT AND PAYMENT

- A. Unit Price Contracts.
 - 1. Traffic control and regulation. Payment will be based on Contractor's Schedule of Values for traffic control and regulation. Include preparation and submittal of traffic control plan if different than shown on Drawings, and provision of traffic control devices, equipment, and personnel necessary to protect the Work and public.
 - 2. Flagmen. Payments will be based on Contractor's Schedule of Values for flagmen.
 - 3. Refer to Division 1 for unit price procedures.
- B. Stipulated Price Contracts. Include payment for work under this section in the total Stipulated Price.

1.3 REFERENCES

- A. Texas Manual on Uniform Traffic Control Devices (TMUTCD).
- B. Article 4413 (29bb), commonly referred to as Private Investigators and Private Security Agencies Act, and Article 2.12, Texas Code of Criminal Procedure.
- C. Areas having jurisdiction feedback and comments related to traffic control.

1.4 SUBMITTALS

- A. Conform to requirements of Division 1.
- B. Traffic control plan:
 - 1. If using traffic control plan contained in the Contract without modification no additional information required.
 - 2. If using a different traffic control plan, submit the plan for approval to the local Governing Jurisdiction, Owner and Engineer. The plan must conform to TMUTCD requirements and be sealed by a Registered Texas Professional Engineer. The Contractor is responsible for obtaining approval from the Governing entity if using an alternate plan.
- C. Submit copies of approved lane closure permits issued by all governmental authorities via owners designated software.
- D. Submit Schedules of Values for traffic control plan and flagmen within ~~30~~ 10 days following Notice to Proceed.
- E. Submit records verifying qualifications of Uniformed Peace Officers and Certified Flagmen proposed for use on the Work via transmittal in owners designated software.

1.5 SUSTAINABLE DESIGN (LEED) REQUIREMENTS

- A. New Schools shall be LEED Certified Projects.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 55 26 Traffic Control

1.6 FLAGMEN

- A. Use Uniformed Peace Officers and Certified Flagmen to control movement of vehicular and pedestrian traffic when construction operations encroach on public traffic lanes.
- B. Uniformed Peace Officer: Individual employed full-time as a peace officer who receives separate compensation as a privately employed flagman. Private employment may be an employee-employer relationship or on an individual basis. Flagman may not be in the employ of another peace officer nor be a reserve peace officer.
 - 1. Uniformed Peace Officers may be:
 - a. Sheriffs and their deputies;
 - b. Constables and deputy constables;
 - c. Marshals or police officers of an incorporated city, town or village; or
 - d. As otherwise provided by Article 2.12, Code of Criminal Procedure.
 - 2. The Uniformed Peace Officer must be a full-time peace officer, must work a minimum average of 32 paid hours per week, and must be paid a rate not less than the prevailing minimum hourly wage rate set by the federal Wage and Hour Act. The individual must be entitled to vacation, holidays, and insurance and retirement benefits.
- C. Certified Flagman: Individual who receives compensation as a flagman and meets the following qualifications:
 - 1. Formally trained and certified in traffic control procedures by the City's E. B. Cape Center.
 - 2. Speaks English. Ability to speak Spanish is desirable but not required.
 - 3. Paid for flagman duty at an hourly rate not less than the wage rate set for Rough Carpenter under the City of Houston's Wage Scale for Engineering Construction.
- D. Certified Flagmen must wear a distinctive uniform, bright-colored vest, and be equipped with appropriate flagging and communication devices while at the Work site. They must also have in their possession while on duty, a proof of training identification card issued by the appropriate training institute.

PART 2 PRODUCTS

2.1 SIGNS, SIGNALS, AND DEVICES

- A. Comply with TMUTCD requirements.
- B. Traffic cones and drums, flares and lights: Conform to local jurisdictions' requirements.

2.2 PORTABLE LOW PROFILE CONCRETE BARRIERS

- A. The low profile concrete barrier is a patented design. Information concerning this barrier may be obtained from Texas Transportation Institute, Texas A&M University System, College Station, Texas 77843-3135, (409) 845-1712.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 55 26 Traffic Control

PART 3 EXECUTION

3.1 PUBLIC ROADS

- A. Submit requests forms for lane closure and sidewalk closure to the appropriate governmental authority prior to need for blocking vehicular lanes or sidewalks. Do not block lanes or sidewalks without approved permits.
- B. Follow laws and regulations of governing jurisdictions when using public roads. Pay for and obtain permits from jurisdiction before impeding traffic or closing lanes. Coordinate activities with Owner's Representative.
- C. Give Owner's Representative one-week notice before implementing approved traffic control phases. Inform local businesses of impending traffic control activities.
- D. Notify police department, fire department, METRO, and local schools, churches, and businesses in writing a minimum of five business days prior to beginning work.
- E. Maintain 10-foot-wide all-weather lanes adjacent to the Work for emergency vehicle use. Keep all-weather lanes free of construction equipment and debris.
- F. Do not obstruct normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by Owner's Representative.
- G. Maintain local driveway access to residential and commercial properties adjacent to work areas at all times. Use all-weather materials approved by architect or Owner's Representative to maintain temporary driveway access to commercial and residential driveways.
- H. Keep streets entering and leaving job site free of excavated material, debris, and foreign material resulting from construction operations in compliance with applicable ordinances.
- I. Remove or cover existing signage and striping that conflict with construction activities or that may cause driver confusion.
- J. Provide safe access for pedestrians along major cross streets.
- K. Alternate closures of cross streets so that two adjacent cross streets are not closed simultaneously.
- L. Do not close more than two consecutive esplanade openings at a time without prior approval from Owner's Representative.

3.2 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and the Owner's operations.
- B. Monitor and control parking of construction personnel's vehicles in existing facilities. Provide a layout plan designating construction personnel parking for approval by owner's representative using submittal procedures in 01 33 00 in kahua. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.3 FLARES AND LIGHTS

- A. Provide lights or reflectors during hours of low visibility to delineate traffic lanes and to guide traffic.

3.4 HAUL ROUTES

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 55 26 Traffic Control

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- A. Utilize haul routes designated by authorities or shown on Drawings for construction traffic.
 - B. Confine construction traffic to designated haul routes.
 - C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.5 TRAFFIC SIGNS AND SIGNALS

- A. Construct necessary traffic control devices for temporary signals required to complete the Work including loop detectors, traffic signal conduits, traffic signal wiring and crosswalk signals. Notify the governmental agency having jurisdiction in advance of need for control boxes and switchgear. The Contractor will pay for all necessary service, programming or adjustments, to signal boxes and switchgear if required during construction.
- B. Install and operate traffic control signals to direct and maintain orderly traffic flow in areas under Contractor's control affected by Contractor's operations. Post notices, signs and traffic controls before moving into next phase of traffic control.
- C. Relocate traffic signs and signals as the Work progresses to maintain effective traffic control.
- D. Unless otherwise approved by Owner's Representative, provide driveway signs with name of business that can be accessed from each crossover. Use two signs for each crossover.
- E. Replace existing traffic control devices in Project area.
- F. Owner's Representative may direct Contractor to make minor adjustments to traffic control signage to eliminate driver confusion and maintain orderly traffic flow during construction at no additional cost to the Owner.

3.6 BRIDGING TRENCHES AND EXCAVATIONS

- A. When necessary, construct bridges over trenches and excavation to permit an unobstructed flow of traffic across construction areas and major drives. Use steel plates of sufficient thickness to support H-20 loading and install to operate with minimum noise. All bridging provided for vehicular or equipment traffic will be approved by an engineer at contractor's expense.
 - 1. Shore trench or excavation to support bridge and traffic.
 - 2. Secure bridging against displacement with adjustable cleats, angles, bolts or other devices when:
 - a. Bridging is placed over existing bus routes,
 - b. More than five percent of daily traffic is comprised of commercial or truck traffic,
 - c. More than two separate plates are used for bridging, and
 - d. When bridge is to be used for more than five consecutive days.
 - 3. Extend steel plates used for bridging a minimum of 1 foot beyond edges of trench or excavation. Use temporary paving materials such as premix to feather edges of plates to minimize wheel impact on secured bridging.

3.7 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings to a depth of 2 feet.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 55 26 Traffic Control

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3.8 TRAFFIC CONTROL, REGULATION AND DIRECTION

- A. Use Flagmen to control, regulate and direct an even flow and movement of vehicular and pedestrian traffic, for periods of time as may be required to provide for public safety and convenience, where:
 - 1. Multi-lane vehicular traffic must be diverted into single lane vehicular traffic,
 - 2. Vehicular traffic must change lanes abruptly,
 - 3. Construction equipment must enter or cross vehicular traffic lanes and walks,
 - 4. Construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalks,
 - 5. Traffic regulation is needed due to rerouting of vehicular traffic around the Work site, and
 - 6. Where construction activities might affect public safety and convenience.
- B. Use of Flagmen to assist in the regulation of traffic flow and movement does not relieve Contractor of responsibility to take other means necessary to protect the Work and public.

3.9 INSTALLATION STANDARDS

- A. Place temporary pavement for single lane closures, in accordance with TMUTCD.
- B. Reinstall temporary and permanent pavement markings as approved by Owner's Representative. When weather conditions do not allow application according to manufacturer's requirements, alternate markings may be considered. Submit proposed alternate to AHJ's or Owner's Representative for approval prior to installation. No additional payment will be made for use of alternate markings.

3.10 MAINTENANCE OF EQUIPMENT AND MATERIAL

- A. Submit name, address and telephone number of individual designated to be responsible for maintenance of traffic handling at construction site to Owner's Representative. Individual must be accessible at all times to immediately correct deficiencies in equipment and materials used to handle traffic including missing, damaged, or obscured signs, drums, barricades, or pavement markings.
- B. Inspect signs, barricades, drums, lamps and temporary pavement markings daily to verify that they are visible, in good working order, and conform with traffic handling plans as approved by Owner's Representative. Immediately repair, clean, relocate, realign, or replace equipment or materials that are not in compliance.
- C. Keep equipment and materials, signs and pavement markings, clean and free of dust, dirt, grime, oil, mud, or debris.
- D. Obtain approval of Owner's Representative to reuse damaged or vandalized signs, drums, and barricades.

End of Section 01 55 26

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DIVISION 1 – GENERAL REQUIREMENTS
Section 01 56 39 Temporary Tree and Plant Protection

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the work, whether temporary or permanent construction.
- B. Related Sections.
 - 1. Division 01 Section “Temporary Facilities and Controls” for temporary site fencing.
 - 2. Division 03 Section “Site Clearing” for removing existing trees and shrubs.
 - 3. Division 32 Section “Turf and Grasses” for turf (lawn) and meadow planting, hydro seeding and erosion control materials.
 - 4. Division 32 Section “Plants” for border edgings.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches (150 mm) above the ground for trees up to, and including, 4-inch (100 mm) size; and 12 inches (300 mm) above the ground for trees larger than 4-inch (100 mm) size.
- B. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a perimeter rigid fence established two (2) feet outside the tree dripline.
- C. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
 - 1. Species and size of tree
 - 2. Location on site plan. Include unique identifier for each.
 - 3. Reason for pruning.
 - 4. Description of pruning to be performed.
 - 5. Description of maintenance following pruning.
- C. Qualification Data: For qualified arborist and tree service firm.
- D. Certification: For arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees are promptly and properly treated and repaired when damaged.
- E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- F. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - 1. Use sufficiently detailed photographs or videotape.

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Section 01 56 39 Temporary Tree and Plant Protection

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2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

- A. Arborist Qualifications: Licensed arborist in jurisdiction where Project is located.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- C. Pre-installation Conference: Conduct conference at Project Site.
 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - b. Enforcing requirements for protection zones.
 - c. Arborist's responsibilities
 - d. Field Quality Control.

1.6 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material
 2. Parking vehicles or equipment
 3. Foot traffic
 4. Erection of sheds or structures
 5. Impoundment of water
 6. Excavation or other digging unless otherwise indicated
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 PRODUCTS

2.1 Materials

- A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch (25 mm) in diameter, and free of weeds, roots, and toxic and other non-soil materials.
 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches (100 mm) deep or more; do not obtain from bogs or marshes.
- B. Topsoil: Complying with plant material notes as indicated on the drawings.

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- C. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Pine Straw
 - 2. Color: Natural
 - 3. Application: Four (4) inches thick
 - D. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
 - 1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2 inch (50 mm) opening, 0.148 inch (3.76 mm) diameter wire chain-link fabric; with pipe posts, minimum 2 -318 inch (60 mm) OD line posts, and 2-718 inch (73 mm) OD corner and pull posts; with 1-518 inch (42 mm) OD top rails, with 0.177 inch (4.5 mm) diameter top tension wire and 0.177 inch (4.5 mm) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
 - 2. Height: 6 feet (1.8 m)
 - 3. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches (914 mm)
 - E. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes pre-punched and reinforced; legibly printed with nonfading lettering and as follows:
 - 1. Size and Text: 18"x 24"
 - 2. Lettering: 3 inch (75 mm) high minimum, white characters on red background

PART 3 EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Tie a 1 inch (25 mm) blue-vinyl tape around each tree trunk at 54 inches (1,372 mm) above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.
 - 1. Apply 4 inch (100 mm) average thickness of organic mulch. Do not place mulch within 6 inches (150 mm) of tree trunks.

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2. In those instances where a proposed vehicular drive occurs within the tree protection zone, 1 inch thick plywood shall be placed a top 6 inch thick organic mulch within the affected area. This application shall remain in place until roots within drive area are pruned under supervision of a licensed arborist for installation of pavement.

3.3 TREE AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 1. Chain-Link Fencing: Install to comply with ASTM F567 and with manufacturer's written instructions.
 2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
 3. Access Gates: Install as described in Section 2.1.D.2; adjust to operate smoothly, easily and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 35 feet (10.5 m) on protection-zone fencing, but no fewer than four signs with each facing a different direction.
- C. Maintain protection zones free of weeds and trash.
- D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
- E. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving".

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- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Prune roots as directed and under the supervision of an arborist licensed in the jurisdiction of the construction activity.
- B. Root pruning at Edge of Protection Zone: Prune roots as directed by arborist licensed in the jurisdiction of the construction activity.
- C. Root Pruning within Protection Zone.

3.6 CROWN PRUNING

- A. Prune branches that affected by temporary and permanent construction. Prune branches as directed by an arborist licensed in the jurisdiction of the construction activity.
 - 1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
 - 2. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
 - 3. Cut branches with sharp pruning instruments; do not break or chop.
 - 4. Do not apply pruning paint to wounds.
- B. Chip removed branches and dispose of off-site.

3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
 - 1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
- C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

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- D. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with topsoil. Place topsoil in a single un-compacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
1. Submit details of proposed root cutting and tree and shrub repairs.
 2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
 3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
 4. Perform repairs within 24 hours.
 5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern. Consult with Architect if tree is a live oak.
1. Provide new trees of same size and species as those being replaced for each tree that measures 4 inches (100 mm) or smaller in caliper size.
 2. Provide two (2) new trees of 6 inch (150 mm) caliper size for each tree being replaced that measure more than 4 inches (100 mm) in caliper size.
 - a. Species: All trees.
 3. Plant and maintain new trees as specified in Division 32 Section "Plants".

3.10 DISPOSAL OR SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

End of Section 01 56 39

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 57 21 Indoor Air Quality Controls

PART 1 GENERAL

1.1 SUMMARY

- A. Construction procedures to promote adequate indoor air quality after construction.
- B. Building flush-out after construction and before occupancy.
- C. Testing indoor air quality before commencement of construction; existing building areas only.
- D. Testing indoor air quality after completion of construction.
- E. Testing air change effectiveness after completion of construction.

1.2 PROJECT GOALS

- A. New Schools shall be LEED Certified Projects.
- B. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
 - 1. Cleaning of ductwork is not contemplated under this Contract.
 - 2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
 - 3. Establish condition of existing ducts and equipment prior to start of alterations.
- C. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
 - 1. Furnish products meeting the specifications.
 - 2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.
- D. Ventilation: HVAC system has been designed to achieve the minimum requirements for ventilation specified in ASHRAE 62.1.

1.3 RELATED REQUIREMENTS

- A. LEED Certification Procedures: LEED credits relating to indoor air quality.
- B. Section 01 40 00 - Quality Requirements: Testing and inspection services.
- C. Section 23 41 00 – Particulate Air Filtration.

1.4 REFERENCE STANDARDS

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012.
- B. ASHRAE Std 62.1 - Ventilation For Acceptable Indoor Air Quality; 2013.
- C. ASHRAE Std 129 - Measuring Air-Change Effectiveness; 1997 (Reaffirmed 2002).
- D. ASTM E779 - Standard Test Method for Determining Air Leakage Rate by Fan Pressurization; 2010.
- E. SMACNA (OCC) - IAQ Guideline for Occupied Buildings Under Construction; 2007.

1.5 DEFINITIONS

- A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 57 21 Indoor Air Quality Controls

1.6 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. LEED Submittals: Submit all submittals required in this section in accordance with procedures specified in Section 01 35 15.
- C. NEW Construction or Additions - Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA IAQ Guidelines for Occupied Buildings Under Construction as a guide.
 - 1. Submit not less than 60 days before enclosure of building.
 - 2. Identify potential sources of odor and dust.
 - 3. Identify construction activities likely to produce odor or dust.
 - 4. Identify areas of project potentially affected, especially occupied areas.
 - 5. Evaluate potential problems by severity and describe methods of control.
 - 6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
 - 7. Describe cleaning and dust control procedures.
 - 8. Describe coordination with commissioning procedures.
- D. NEW Construction or Additions- Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.
- E. Duct and Terminal Unit Inspection Report.
- F. Air Contaminant Test Plan: Identify:
 - 1. Testing agency qualifications.
 - 2. Locations and scheduling of air sampling.
 - 3. Test procedures, in detail.
 - 4. Test instruments and apparatus.
 - 5. Sampling methods.
- G. Air Contaminant Test Reports: Show:
 - 1. Location where each sample was taken, and time.
 - 2. Test values for each air sample; average the values of each set of
 - 3. HVAC operating conditions.
 - 4. Certification of test equipment calibration.
 - 5. Other conditions or discrepancies that might have influenced results.
- H. Ventilation Effectiveness Test Plan: Identify:
 - 1. Testing agency qualifications.
 - 2. Description of test spaces, including locations of air sampling.
 - 3. Test procedures, in detail; state whether tracer gas decay or step-up will be used.
 - 4. Test instruments and apparatus; identify tracer gas to be used.
 - 5. Sampling methods.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 57 21 Indoor Air Quality Controls

I. Ventilation Effectiveness Test Reports: Show:

1. Include preliminary tests of instruments and apparatus and of test spaces.
2. Calculation of ventilation effectiveness, E.
3. Location where each sample was taken and time.
4. Test values for each air sample.
5. HVAC operating conditions.
6. Other information specified in ASHRAE 129.
7. Other conditions or discrepancies that might have influenced results.

1.7 QUALITY ASSURANCE

- A. Testing and Inspection Agency Qualifications: Independent testing agency having minimum of 3 years' experience in performing the types of testing specified.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.
- B. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURES

- A. Prevent the absorption of moisture and humidity by adsorptive materials by:
1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Begin construction ventilation when building is substantially enclosed.
- C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.
- D. When working in a portion of an occupied building, prevent movement of air from construction area to occupied area.
- E. HVAC equipment and supply air ductwork may be used for ventilation during construction:
1. Operate HVAC system on 100 percent outside air, with 1.5 air changes per hour, minimum.
 2. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.
 3. Where return air ducts must be used for ventilation, install auxiliary filters at return inlets, sealed to ducts; use filters with at least the equivalent efficiency as those required at supply air side; inspect and replace filters when they lose efficiency.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 57 21 Indoor Air Quality Controls

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- F. Do not store construction materials or waste in mechanical or electrical rooms.
 - G. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
 - 1. Inspect duct intakes, return air grilles, and terminal units for dust.
 - 2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 - 3. Clean tops of doors and frames.
 - 4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 - 5. Clean return plenums of air handling units.
 - 6. Remove intake filters last, after cleaning is complete.
 - H. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
 - I. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures.
- 3.2 BUILDING FLUSH-OUT – REQUIRED FOR NEW CONSTRUCTION
- A. Perform building flush-out before occupancy.
 - B. Do not start flush-out until:
 - 1. All construction is complete.
 - 2. HVAC systems have been tested, adjusted, and balanced for proper operation.
 - 3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
 - 4. New HVAC filtration media have been installed.
 - C. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot (4500 cubic meters per square meter) of floor area has been supplied.
 - 1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
 - 2. Maintain interior temperature of at least 60 degrees F (15 degrees C) and interior relative humidity no higher than 60 percent.
 - 3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
 - 4. If interior spaces must be occupied prior to completion of the flush-out, supply a minimum of 25 percent of the total air volume prior to occupancy, and:
 - a. Begin ventilation at least three hours prior to daily occupancy.
 - b. Continue ventilation during all occupied periods.
 - c. Provide minimum outside air volume of 0.30 cfm per square foot (0.0015 cubic meters) or design minimum outside air rate, whichever is greater.
 - D. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

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Section 01 57 21 Indoor Air Quality Controls

3.3 AIR CONTAMINANT TESTING – OWNER’S OPTION: NEW CONSTRUCTION

- A. Perform air contaminant testing before starting construction, as base line for evaluation of post- construction testing.
- B. Perform air contaminant testing before occupancy.
- C. Do not start air contaminant testing until:
 - 1. All construction is complete, including interior finishes.
 - 2. HVAC systems have been tested, adjusted, and balanced for proper operation.
 - 3. New HVAC filtration media have been installed.
- D. Indoor Air Samples: Collect from spaces representative of occupied areas:
 - 1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
 - 2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet (2300 square meters); take samples from areas having the least ventilation and those having the greatest presumed source strength.
 - 3. Collect samples from height from 36 inches (915 mm) to 72 inches (1830 mm) above floor.
 - 4. Collect samples from same locations on 3 consecutive days during normal business hours; average the results of each set of 3 samples.
 - 5. Exception: Areas with normal very high outside air ventilation rates, such as laboratories, do not need to be tested.
 - 6. When retesting the same building areas, take samples from at least the same locations as in first test.
- E. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.
- F. Analyze air samples and submit report.
- G. Air Contaminant Concentration Determination and Limits:
 - 1. Carbon Monoxide: Not more than 9 parts per million and not more than 2 parts per million higher than outdoor air.
 - 2. Airborne Mold and Mildew: Measure in relation to outside air; not higher than outside air.
 - 3. Formaldehyde: Not more than 27 parts per billion.
 - 4. Total Volatile Organic Compounds (TVOC): Not more than 500 micrograms per cubic meter.
 - 5. 4-Phenylcyclohexene (4-PCH): Not more than 6.5 micrograms per cubic meter.
 - 6. Particulates (PM10): Not more than 50 micrograms per cubic meter.
 - 7. Total Particulates (PM): Measure in micrograms per cubic meter, in relation to outside air; not more than 20 micrograms per cubic meter higher than outside air.
 - 8. Regulated Pollutants: Measure in relation to outside air; not more than contained in outside air.

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Section 01 57 21 Indoor Air Quality Controls

- H. If air samples show concentrations higher than those specified, ventilate with 100 percent outside air and retest at no cost to Owner, or conduct full building flush-out specified above.

3.4 VENTILATION EFFECTIVENESS TESTING

- A. Perform ventilation effectiveness testing before occupancy.
- B. Do not begin ventilation effectiveness testing until:
 - 1. HVAC testing, adjusting, and balancing has been satisfactorily completed.
 - 2. Building flush-out or air contaminant testing has been completed satisfactorily.
 - 3. New HVAC filtration media have been installed.
- C. Test each air handler zone in accordance with ASHRAE 129.
- D. If calculated air change effectiveness for a particular zone is less than 0.9 due to inadequate balancing of the system, adjust, and retest at no cost to Owner.

End of Section 01 57 21

DIVISION 1 – GENERAL REQUIREMENTS

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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 60 00 Product Requirements

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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 10 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 60 00 Product Requirements

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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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 60 00 Product Requirements

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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. Contractor to obtain approval for use of products listed.
- 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:
 - b. 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.
 - c. 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 60 00 Product Requirements

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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

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. VOC restrictions for product categories listed below under "DEFINITIONS."
- B. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

1.2 DEFINITIONS

- A. VOC-Restricted Products: All products of each of the following categories when installed or applied on-site in the building interior:
 - 1. Adhesives, sealants, and sealer coatings.
 - 2. Carpet.
 - 3. Carpet cushion.
 - 4. Carpet tile.
 - 5. Resilient floor coverings.
 - 6. Wood flooring.
 - 7. Paints and coatings.
 - 8. Insulation.
 - 9. Gypsum board.
 - 10. Acoustical ceilings and panels.
 - 11. Cabinet work.
 - 12. Student and teacher desks, tables, and chairs.
 - 13. Systems furniture and seating.
 - 14. Wall coverings.
 - 15. Composite wood and agrifiber products used either alone or as part of another product.
 - 16. Other products when specifically stated in the specifications.
- B. Interior of Building: Anywhere inside the exterior weather barrier.
- C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.3 REFERENCE STANDARDS

- A. LEM - Low-Emitting Materials Product List; Collaborative for High Performance Schools
- B. VOC - Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers
- C. CRI (GLP) - Green Label Plus Carpet Testing Program - Approved Products; Carpet and Rug Institute; Current Edition.
- D. GEI (SCH) - GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.greenguard.org.
- E. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scs-certified.com.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

- B. Evidence of Compliance: Submit for each different product in each applicable category.
 - 1. Identify evidence submittals with the words "LEED Report".
- C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.
- D. Installer Certifications for Accessory Materials: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of their products, or 2) that such products used comply with these requirements.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified.
 - 1. Product data submittals showing VOC content are NOT acceptable forms of evidence.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

End of Section 01 61 16

DIVISION 1 – GENERAL REQUIREMENTS

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 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 if not part of the original scope of work.
 - 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution

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1. Structural Elements: When cutting and patching structural elements, notify Architect and district representative of locations and details of cutting. 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 but not be limited to:
 - 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 when applicable.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution

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 and owner 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.
- 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,

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution

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 or owner's representative 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 owner's representative. Submit log at project completion for project records.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution

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. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. 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.
- E. 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.
- F. 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.
- G. 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.
- H. 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution

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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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution

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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 or **owner's representative fourteen (14) days prior to the start of owner's contractor** 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.

DIVISION 1 – GENERAL REQUIREMENTS

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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 (7) days during normal weather or three (3) 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 insure 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

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution

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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 73 00 Execution



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



Template Revised
8/10/2022

General Contractor - Closeout Checklist

Not Applicable Items are to be Noted in the Remarks Column

To: <<Name>>, Director of Design and Construction Date: _____
 GC: _____ A/E Firm: _____
 BP#: _____ PM: _____
 School Name: _____
 Project Type: ☐ Addition ☐ Renovations ☐ New Construction

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks
SUBSTANTIAL COMPLETION REQUIREMENTS - Closeout and Punch List Items are NOT to be billed at Substantial Completion				
a.	Fire Alarm System Components Completed	GC		
b.	Local Fire Marshal Approval Certificate	GC		
c.	HVAC Air and Water Balancing Completed	GC		
d.	Energy Management Systems Completed	GC		
e.	Communications Equipment and Telephone Systems Completed	GC		
f.	Final Lockset Cores Installed	GC		
g.	Room Plaques and Exterior Signage Completed	GC		
h.	Owner Demonstrations and Training Completed	GC		
i.	Exterior Clean-up and Landscaping Completed	GC		
j.	Final Interior Clean-up Completed	GC		
k.	Certificate of Occupancy	GC		
l.	Punch List Report	GC, A/E		

FINAL COMPLETION REQUIREMENTS: CLOSEOUT ITEMS TO BE SUBMITTED WITH FINAL PAYMENT - Allowed billable amount on G702: 100% of contract

1 SUBSTANTIAL COMPLETION				
a.	Certificate of Substantial Completion	PM		
b.	Signed Off Punchlist	GC		
2 WARRANTIES				
a.	List of Subcontractors and Suppliers	GC		Include Name, Address, Phone Number and Discipline
b.	Contractor's 1 year Warranty	GC		
c.	Subcontractors' 1 year Warranties	GC		
d.	Manufacturers' Warranties	GC		A separate "Warranties" manual should be provided for guarantees, warranties, etc.

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks
3 EVIDENCE OF PAYMENT OF DEBTS AND CLAIMS				
a.	"Contractor's Affidavit of Payment of Debts and Claims" (Confirm GC and Sub Lien Waivers are attached to form.)	GC		
b.	"Contractor's Final Affidavit of Release of Liens"; (Confirm GC and Sub Lien Waivers are attached to form.)	GC		
c.	"Consent of Surety Company to Final Payment"; (Confirm that Power of Attorney is attached to form.)	GC		
4 INSURANCE				
a.	Certificate(s) of Insurance, All insurance must be maintained for one year following substantial completion	GC		
b.	Written Statement that the Contractor Knows of no Substantial Reason that the Insurance will not be Renewable to Cover the Required Period	GC		
5 OPERATIONS AND MAINTENANCE MANUALS AND EVIDENCE OF TRAINING				
a.	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. Electronic Copy and 1 Hard Copy.
b.	Training Matrix, Sign-In sheet(s) and Videos.	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 training. 1 digital copy of Training Videos.
6 ATTIC STOCK / SPARE MATERIAL / KEY TRANSFER				
a.	Signed off Transmittal of Extra (Attic) Stock	GC		Provided by GC and received by Principal or Campus Facilities 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.
7 LOCAL AGENCIES APPROVALS (as applicable)				
a.	Certificate of Occupancy	GC		
b.	Final Building Inspections/Closed Construction Permits	GC		Green tags colored copies
c.	State Fire Marshal's Fire Alarm Inspection Certificate & Testing	GC		
d.	Storm Water Prevention Pollution Plan (SWPPP)	GC		
e.	Elevator Inspection Certificate	GC		
f.	Boiler Inspection Certificate	GC		
g.	Health Department Inspection Certificate	GC		
8 RECORD DOCUMENTS (DRAWINGS, SPECIFICATIONS, ETC.)				
a.	Record Documents, Submit 1 Hard Copies and 1 PDF Copy	GC		
9 GC DESIGNED DOCUMENTS (as applicable)				
a.	Fire Alarm drawings	GC		Need AHJ approved documents.
b.	Security drawings	GC		Need AHJ approved documents (if applicable)

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks
c.	HVAC Controls drawings	GC		
d.	Fire Sprinkler System drawings	GC		Need AHJ approved documents.
e.	Data Cabling drawings	GC		
10 CERTIFICATIONS				
a.	Certification of Asbestos Free Project: Letter from GC and A/E, Letters from Subs	GC, A/E		
b.	Certification of Lead-Free Potable Water System: Letters from GC and Subs	GC		
c.	Certification of PCB-Free Project: Letters from GC and Subs	GC		
11 FINAL SYSTEM REPORTS				
a.	Final Test & Balance Report	T&B		
b.	Final Roof Inspection Report	Roof Inspector		
12 LEED CONSTRUCTION SUBMITTAL				
a.	Sustainable Sites <i>SSp1</i> - Construction Activity Pollution Prevention: Erosion & Sedimentation Control Plan	GC		
b.	Materials and Resources <i>MRp2</i> & <i>MRC5</i> - Construction Waste Management: Const. Waste Mgmt. Plan	GC		
c.	Materials and Resources <i>MRC3</i> - Sourcing of Raw Materials: Building Product Disclosure & Optimization Calculator (BPDO)	GC		
d.	Environmental Quality <i>EQc3</i> - IAQ Management Plan for Construction and Preoccupancy Phases	GC		
e.	Environmental Quality <i>EQc2</i> - Low Emitting Materials: Low Emitting Materials Calculator	GC		
13 FINAL COMPLETION				
a.	Copy of Final Change Order	A/E, GC, PM		
b.	TEA - Certification of Project Compliance	A/E, GC, FBISD, PM		
c.	TAS/TDLR Certification (if applicable)	AE		
d.	Complete Set of Approved Submittals Log from Prolog	GC		Include Prolog Summary Log in Binder
e.	Final Completion Certificate	A/E, GC, PM		
RETAINAGE				
a.	FBISD Retention Release Reduction Worksheet	PM		
b.	Purchase Order Closure	PC		
WARRANTY INSPECTIONS				
a.	11 month inspection after Date of Substantial Completion	PM		

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CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

Project _____

Job No. _____

On receipt by the signer of this document of a check from _____ (maker of check) in the sum of \$_____ payable to _____ (payee or payees of check) and when the check has been properly endorsed and has been paid by the bank on which it is drawn, this document becomes effective to release any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position that the signer has on the property of _____ (owner) located at _____ (location) to the following extent: _____ (job description).

This release covers the final payment to the signer for all labor, services, equipment, or materials furnished to the property or to _____ (person with whom signer contracted).

Before any recipient of this document relies on this document, the recipient should verify evidence of payment to the signer.

The signer warrants that the signer has already paid or will use the funds received from this final payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project up to the date of this waiver and release.

Date _____

_____ (Company name)

By _____ (Signature)

_____ (Title)

=====

NOTE: Section 53.281(b)(2), Texas Property Code, requires that the above form be notarized. See Chapter 121, Texas Civil Practice & Remedies Code, regarding Acknowledgments & Proofs of Written Instruments, or consult an attorney. For short acknowledgement forms that might be suitable, see Section 121.008 in Chapter 121. Click [here](#) to go there.

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NOTICE:

This document waives rights unconditionally and states that you have been paid for giving up those rights. It is prohibited for a person to require you to sign this document if you have not been paid the payment amount set forth below. If you have not been paid, use a conditional release form.

UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

Project _____

Job No. _____

The signer of this document has been paid in full for all labor, services, equipment, or materials furnished to the property or to _____ (person with whom signer contracted) on the _____ property of _____ (owner) located at _____ (location) to the following extent: _____ (job description). The signer therefore waives and releases any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position.

The signer warrants that the signer has already paid or will use the funds received from this final payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project up to the date of this waiver and release.

Date _____

_____(Company name)

By _____(Signature)

_____(Title)

=====

NOTE: Section 53.281(b)(2), Texas Property Code, requires that the above form be notarized. See Chapter 121, Texas Civil Practice & Remedies Code, regarding Acknowledgments & Proofs of Written Instruments, or consult an attorney. For short acknowledgement forms that might be suitable, see Section 121.008 in Chapter 121. Click [here](#) to go there.

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WARRANTY LETTER
PLEASE PRINT ON YOUR COMPANY LETTERHEAD

WARRANTY FOR:

Fort Bend ISD BOND 2023:

We, the undersigned, hereby warrant that Work described above which we have furnished and/or installed for the following project:

PROJECT TITLE: Job # _____,

PROJECT ADDRESS:

The project is in accordance with the Contract Documents, including guaranteeing all of the work under the contract to be free from faulty materials in every particular, and free from improper workmanship, and against injury except from proper and usual wear and tear; and agreeing to replace or re-execute without cost to the Owner such work as may be found to be improper, imperfect or of unsatisfactory material and/or workmanship, without cost to the Owner, and to make good all damage caused to other work or materials, or to the Owner's property, real and personal, due to such improper, imperfect or faulty material and/or workmanship, and/or due to the required replacement or re-execution. Such warranty periods shall be maintained notwithstanding that certain systems may be activated prior to Substantial Completion as required for the satisfactory completion of the project. This guarantee shall be made to cover a period of one (1) year from the date of Substantial Completion as certified by the Architect under this Contract.

CONTRACTOR:

Company Name: _____

By: _____
(Signature)

(Contact Name & Title)

(Address)

(Phone Number)

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(PROJECT NAME)
FBISD PROJECT NO:

ASBESTOS FREE AFFIDAVIT

ASBESTOS FREE AFFIDAVIT

I understand that the Fort Bend Independent School District, in order to protect the students, staff and public in general from any unnecessary exposure to asbestos fibers, and to comply with the Asbestos Hazard Emergency Response Act prohibits the use of asbestos containing materials in all forms in the construction and operation of their facilities.

I certify that I am familiar with the materials used in the construction of, and incorporated into, the construction described below. I further certify that to the best of my knowledge and belief, no asbestos containing building materials (ACBM) either friable or otherwise were used in the process of construction or incorporated into the construction of the building.

CAMPUS LOCATION:

SCOPE OF WORK: _____

SPECIFICATION SECTION(S): _____

SUBCONTRACTOR: _____

General Contractor's Signature

Date

General Contractor's Printed Name & Title

Failure to complete this waiver constitutes non-compliance with the job specifications and an unacceptable job.

Signed before me this ____ day of _____, 20____

Notary Public: _____

My commission expires: _____

As the architect and/or project engineer responsible for the above said project I certify that no asbestos containing building materials were specified as a building material in the building as specified in 40 CFR 763.99(a)(7).

Architect's or Project Engineer's Stamp

Signature

Date

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(PROJECT NAME)
FBISD PROJECT NO:

LEAD FREE AFFIDAVIT

LEAD FREE AFFIDAVIT

I understand that the Fort Bend Independent School District, in order to protect the students, staff and public in general from any unnecessary exposure to Lead, and to comply with the U.S. Code for a "LEAD FREE" drinking water system. "No person may use any pipe, any pipe or plumbing fitting or fixture, any solder, or any flux, after June 19, 1986, in the installation or repair of- (i) any public water system; or (ii) any plumbing in a residential or nonresidential facility providing water for human consumption, that is not LEAD FREE (within the meaning of subsection (d) of this section). [42 USC§ 300g-6]"

I certify that I am familiar with the materials used in the construction of, and incorporated into, the construction described below. I further certify that to the best of my knowledge and belief, no lead containing building materials were used in the process of construction or incorporated into the construction of the drinking water system in the building.

CAMPUS(ES):

SCOPE OF WORK: _____

SPECIFICATION SECTION(S): _____

SUBCONTRACTOR: _____

General Contractor's Signature

Date

General Contractor's Printed Name & Title

Failure to complete this waiver constitutes non-compliance with the job specifications and an unacceptable job.

Signed before me this ____ day of _____, 20____

Notary Public: _____

My commission expires: _____

As the architect and/or project engineer responsible for the above said project I certify that no lead containing building materials were specified as a building material in the building as specified in 42 U.S. Code§ 300g-l - National drinking water regulations.

Architect's or Project Engineer's Stamp

Signature

Date

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(PROJECT NAME)
FBISD PROJECT NO:

PCB FREE AFFIDAVIT

PCB FREE AFFIDAVIT

I understand that the Fort Bend Independent School District, in order to protect the students, staff and public in general from any unnecessary exposure to polychlorinated biphenyls (PCB's), and to comply with the U.S. Environmental Protection Agency's recommendation for schools to eliminate PCB containing building material in all forms in the construction and operation of their facilities. I certify that I am familiar with the materials used in the construction of, and incorporated into, the construction described below. I further certify that to the best of my knowledge and belief, no polychlorinated biphenyls containing building materials (PCBs) were used in the process of construction or incorporated into the construction of the building.

CAMPUS(ES):

SCOPE OF WORK: _____

SPECIFICATION SECTION(S): _____

SUBCONTRACTOR: _____

General Contractor's Signature

Date

General Contractor's Printed Name & Title

Failure to complete this waiver constitutes non-compliance with the job specifications and an unacceptable job.

Signed before me this ____ day of _____, 20____

Notary Public: _____

My commission expires: _____

As the architect and/or project engineer responsible for the above said project I certify that no PCB containing building materials were specified as a building material in the building as specified in 40 CFR 761.20.

Architect's or Project Engineer's Stamp

Signature

Date

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DIVISION 1 – GENERAL REQUIREMENTS
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 sub-systems 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 owner's representative.
 - 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. One (2) paper copy and (2) electronic copies on separate usb devices delivered at substantial completion.
 - 3. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 calendar days before commencing demonstration and training. Architect

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 23 Operation and Maintenance Data

will comment on whether general scope and content of manual are acceptable.

- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion. Architect will return copy with comments.
 - 1. Correct or modify each manual to comply with Architect and owner's representative Comments. Submit copies 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 23 Operation and Maintenance Data

- 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 manuals 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 23 Operation and Maintenance Data

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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 23 Operation and Maintenance Data

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- 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 23 Operation and Maintenance Data

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- 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. Provide transmittal from district's construction management software for transmittance of extra parts.
 - H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
 - I. 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 23 Operation and Maintenance Data

- 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

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DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 39 Project 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 one paper copy set as well as PDF electronic files of marked-up record prints and two sets of plots from corrected record digital data files on a single usb device. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal: Submit one paper copy set, a PDF electronic files of marked-up record prints on a single usb device.
- B. Record Specifications: Submit as PDF electronic file of Project's Specifications, including addenda and contract modifications on a single usb device.
- C. Record Product Data: Submit as PDF electronic file of each approved submittal.
 - 1. Submit where record Product Data are required as part of operation and maintenance manuals. 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.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 39 Project Record Documents

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 record prints with Architect. When authorized, submit marked-up record prints to Architect. The Architect will then prepare a full set of corrected digital data files of the Contract Drawings, as follows:

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 39 Project Record Documents

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. Format: Annotated PDF electronic file.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 78 39 Project Record Documents

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- 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

DIVISION 1 – GENERAL REQUIREMENTS
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.
 - 4. O&M Manuals should be uploaded into Owner's designated software (Kahua)
- 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 with closeout documentation per section 01 77 00 closeouts.
 - 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 qualified representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 79 00 Demonstration and Training

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations. Provide a minimum (14) day advanced notice.
- 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. 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 as applicable:
 - 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:

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 79 00 Demonstration and Training

- 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 79 00 Demonstration and Training

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's representative with at least 14 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 and owner's representative.
- 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 77 00

SECTION 20 05 00

CODES AND STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.

1.2 CODES: DIVISIONS 20 - 28

- A. Code Design Basis: The following codes and ordinances were used in the design of the project and shall be complied with during construction of the project.

- 1. Refer to each discipline's cover sheet per school for codes and ordinances followed.

1.3 STANDARDS

- A. Refer to Division 1 for general administrative/procedural requirements related to compliance with applicable standards. This Work and all materials shall meet the standards set forth in the applicable portions of the following recognized standards:

- 1. ADC Air Diffusion Council
 - 2. AEIC Association of Edison Illuminating Companies
 - 3. AGA American Gas Association
 - 4. AHRI Air Conditioning, Heating, and Refrigeration Institute
 - 5. AMCA American Movement and Control Association
 - 6. ANSI American National Standards Institute
 - 7. ASHRAE.. American Society of Heating, Refrigerating, and Air Conditioning Engineers
 - 8. ASME American Society of Mechanical Engineers
 - 9. ASPE American Society of Plumbing Engineers
 - 10. ASSE American Society of Sanitary Engineering
 - 11. ASTM..... American Society for Testing and Materials
 - 12. AWS American Welding Society
 - 13. AWWA American Water Works Association
 - 14. CBM..... Certified Ballast Manufacturers
 - 15. CDA Copper Development Association
 - 16. CE Corps of Engineers (U.S. Department of the Army)
 - 17. CISPI Cast Iron Soil Pipe Institute
 - 18. EIA..... Electronic Industry Association
 - 19. EPA Environmental Protection Agency
 - 20. ETL Electrical Testing Laboratory
 - 21. FAA..... Federal Aviation Administration (U.S. Department of Transportation)
 - 22. FCC Federal Communications Commission
 - 23. FM Factory Mutual Engineering Corporation

- 24. FS..... Federal Specification (General Services Administration)
- 25. ICEA Insulated Cable Engineering Association
- 26. IEEE Institute of Electrical and Electronics Engineers
- 27. IES..... Illuminating Engineering Society of North America
- 28. IRI..... Industrial Risk Insurers
- 29. LPI Lightning Protection Institute
- 30. MCAA Mechanical Contractors Association of America
- 31. MIL Military Standardization Documents (U.S. Department of Defense)
- 32. MSS..... Manufacturers Standardization Society of the Valve and Fittings Industry
- 33. NAIMA North American Insulation Manufacturers Association
- 34. NEC National Electrical Code (by NFPA)
- 35. NECA..... National Electrical Contractor Association
- 36. NEMA National Electrical Manufacturers Association
- 37. NFPA National Fire Protection Association
- 38. OSHA Occupational Safety Health Administration (U.S. Department of Labor)
- 39. PDI Plumbing and Drainage Institute
- 40. SMACNA . Sheet Metal and Air Conditioning Contractor's National Association
- 41. UL..... Underwriters' Laboratories, Inc.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 20 05 01

SCOPE OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, and Drawings apply to all Work herein.
- B. Refer to Specification Section 20 05 00 for related required Codes and Standards.
- C. Refer to Specification Section 20 05 04 for related required Schedule of Submittal Data.
- D. Requirements of Division 20 apply to all Work of Divisions 20-28.

1.2 SCOPE

- A. General: Provide all labor, materials, tools, machinery, equipment, supplies, transportation, storage, utilities, appliances, drayage, hauling, hoisting, excavation, backfill, supervision, and services necessary to complete the Fire Suppression, Plumbing, Heating, Ventilating, and Air Conditioning, Automation, Electrical, Communications, and Electronic Safety Work under this Contract. Pay all fees, tap charges, meter charges, permits, licenses, inspections, and special fees assessed by the local utilities and local authorities having jurisdiction. Coordinate Work with the Work of the other trades so as to resolve conflicts without impeding job progress.
- B. Examine the Architectural, Structural, Mechanical, Plumbing, and Electrical Drawings and other Divisions, and Sections of the Specifications in order to determine the extent of Work required to be completed. Failure to examine all the Contract Documents for this Project will not relieve the Contractors of the responsibility to perform all the Work required for a complete, fully operational and satisfactory installation.
- C. Project Location: The Work to be performed under this Contract is all in connection with the construction and erection of a new building or renovations in an existing building located in Fort Bend County, Texas.
- D. Work Included: The Work includes but is not limited to the following systems, equipment, and services:
 - 1. Tagging and identification of equipment, valves, piping, and conduit, etc.
 - 2. Radiation protection for ductwork, piping, and conduit penetration of walls surrounding various radiotherapy department rooms.
 - 3. Connection of all equipment furnished under other Divisions and/or by the Owner.
 - 4. All water services for the building, including all required fees.
 - 5. All electric services for the building, including all required fees.
 - 6. Furnishing of Shop Drawings, Product Data and Samples.

7. Furnishing of Record Drawings.
8. Start-up, testing, balancing, and adjusting of systems as specified in Divisions 20-28.
9. Furnishing of operating and maintenance books.
10. Miscellaneous items as required for complete and functioning systems as specified, as indicated on the Drawings, and as required.
11. All systems, equipment, and services specified shall be furnished and installed complete and ready to use.
12. Performance and acceptance testing of equipment and systems as specified and as required by Authorities Having Jurisdiction. Refer to Sections in Divisions 20-28 titled "Start-up, Testing, Balancing, and Adjusting" for additional requirements. Participate in and provide labor as required for "off-hour" testing of equipment and systems if required by job conditions or by the Authorities Having Jurisdiction and as required to obtain the "Certificate of Occupancy (CO)".

1.3 WORK OF OTHER DIVISIONS

A. The following is a partial list of work not included in Divisions 20-28:

1. Factory finish painting is included in the work of these Divisions. Prime, protective, and field finish painting is included in the work of Division 9, except as otherwise specified herein. The Work of these Divisions includes coordinating the painting of Division 20-28 systems with the Division 9 contractor.
2. Motors and motor controllers that are an integral part of the equipment are furnished under the Division with the driven equipment. All other motor controllers, electrical wiring and connections are included in the work of Division 26.
3. Concrete housekeeping pads, equipment pads, fill for equipment inertia bases, and water curbs are specified under Division 3. Dimensions and locations of pads, inertia bases, and curbs for equipment furnished under Divisions 21-28 are included in the Work of the respective Division.
4. Installing access doors. Provision of access doors are included in the Work of Divisions 21-28.
5. Owner and General Contractor furnished equipment. Fire Suppression, Plumbing, Heating, Ventilating, and Air Conditioning, Automation, Electrical, Communications, and Electronic Safety provisions, including rough-in and final connections, are included in the Work of the respective Division.
6. Metal louvers.
7. Cooling tower supporting structure to be provided by the contractor.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 20 05 03

BASIC DIVISION 20-28 REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.

1.2 COMPLETE PERFORMANCE

- A. The Contractor shall furnish and install all items specified herein and as indicated on the Drawings. The Contractor shall also furnish and install all items necessary to make the systems function which may be reasonably implied as essential, whether mentioned in the Contract Documents or not.
- B. Each Contractor for Divisions 20-28 shall provide competent, experienced full time superintendents who are authorized to make decisions on behalf of the Contractor.
- C. Work shall be executed in strict accordance with the best practice of the trades in a thorough, substantial and workmanlike manner by competent workmen.

1.3 SITE FAMILIARIZATION

- A. General: Become familiar with the Drawings and Specifications, examine the premises, and understand the conditions under which the Contract shall be performed, prior to submitting a bid.
- B. Site: Be informed of the site conditions, verify locations of new and existing equipment, and determine exact requirements for connections.
- C. Coordination: Tender of a proposal for this project infers that the Contractor has visited the site and has become familiar with the Drawings, Specifications, and site conditions and has included in his proposal, all work necessary to properly install complete and functioning systems on the project. Failure to comply with this requirement shall not be considered justification for the omission or faulty installation of any Work covered by the Contract Documents.

1.4 CODES AND STANDARDS

- A. General: All Work shall comply with the most recently revised versions of all applicable laws, rules, regulations and ordinances of all Federal, State and Local Authorities and applicable Utilities. None of the terms or provisions of this Specification shall be construed as waiving any part of the laws, rules, regulations or requirements of these Authorities.

- B. Asbestos: Be aware of and comply with Asbestos NESHAP (National Emission Standard for Hazardous Air Pollutants) regulations, as well as all other applicable codes, laws, and regulations.
- C. Conflict: In the event of conflict between the Contract Documents and the local enforcing authority, the latter shall rule. Any modifications resulting therefrom shall be made without any additional cost to the Owner or Architect/Engineer. This Contractor shall report any such modifications to the Architect/Engineer and secure his approval prior to proceeding with the work.
- D. Precedence: Where Contract Document requirements exceed the requirements of the Codes and Standards, the Contract Documents shall take precedence provided they are not in conflict with those Codes and Standards.
- E. Approval Labels: All items of equipment and all materials for which approved standards have been established by Underwriters' Laboratories, Inc. (UL), Factory Mutual (FM), Certified Ballast Manufacturer (CBM), Electrical Testing Laboratory (ETL), National Manufacturers Association (NEMA), American Standard Codes, ASME, AGA, AMCA, ASA, ANSI, ASHRAE, and ARI shall be so approved and shall bear approval labels attesting to same.

1.5 DRAWINGS AND SPECIFICATIONS

- A. Drawings: The Drawings are schematic in nature and indicate approximate locations of the heating, ventilating, and air conditioning systems, fire protection systems, plumbing equipment, fixtures and piping systems, and electrical items, except where specific locations are noted and dimensioned on the Drawings. All items are shown approximately to scale. The intent is to show how these items shall be integrated into the construction. Locate all items by on the job measurements and in accordance with the Contract Documents. Coordinate with other trades.
- B. Location: Prior to locating diffusers, grilles, plumbing fixtures, fire hose cabinets, plumbing items, outlets, switches, fixtures, fire alarm devices, sprinkler heads, and other exposed devices, obtain the Architect's approval as to exact location. Locations shall not be determined by scaling Drawings. Mount plumbing fixtures, fire hose racks, cabinets, outlets, switches, and other wall-mounted devices at heights as directed by the Architect. Contractor shall be responsible for costs of redoing work of trades necessitated by failure to comply with this requirement.
- C. Specifications: The specifications are intended to supplement the Drawings and it is not in the scope of the Specifications to mention any part of the work that the Drawings are competent to fully explain. Conversely, any part of the work that the specifications are competent to fully explain may not be mentioned on the Drawings. Drawings and Specifications are complimentary/supplementary documents to each other.
- D. Disagreement: Disagreement between the Drawings and Specifications or within the Drawings or Specifications shall be estimated and/or bid using the better quality or greater quantity of material or installation, and a clarification request for information shall be made to the Architect/Engineer in a timely manner after the Project is under contract.

1.6 DISCREPANCIES

- A. Clarification: Clarification of significant cost matters shall be obtained before submitting a proposal for the Work under Divisions 20-28 as to discrepancies or omissions from the Contract Documents or questions as to the intent thereof.
- B. Detailed Instructions: Should it appear that the work hereby intended to be done or any of the materials relative thereto is not sufficiently detailed or explained in the Drawings or Specifications, then the Contractor shall apply in a timely manner to the Engineer for clarification or explanations as may be necessary, allowing a reasonable time for the Engineer to respond. The Contractor shall conform to this additional information as a part of the Contract without additional cost to the Owner or Engineer.
- C. Interpretations: Should any doubt or question arise respecting the true meaning of Drawings or Specifications, reference shall be made to the Engineer, whose written decision shall be final and conclusive. No alleged statement by the Engineer will be accepted as an excuse for non-compliance or inferior work.
- D. Contractor Agreement: Consideration will not be granted for misunderstanding of the amount of work to be performed. Tender of a proposal conveys full Contractor agreement of the items and conditions specified, shown, scheduled, or required by the nature of the project, and all costs are included in the proposal.

1.7 REQUESTS FOR INFORMATION (RFI)

- A. General: Submit all Contractor Requests for Information (RFI) in writing to the Architect/Engineer for response. Submit RFI on a standard form that has a space for the requested information and the Architect/Engineer's response. Electronic submissions shall be sent to RFI@wylieeng.com.
- B. Solution Proposal: In general, the Contractor shall propose solutions to identified problems for review and approval of the Architect/Engineer. The RFI shall include hand sketches, marked drawing prints, equipment cutsheets, drawing and specification references, and any other back-up information, etc., as required to sufficiently explain the problem and proposed solution.

1.8 QUALITY ASSURANCE

- A. General: Materials and equipment shall be new, of best grade and quality, and standard products of reputable manufacturers regularly engaged in the production of such materials and equipment.
- B. Workmanship: Work shall be executed, and materials installed in accordance with the best practice of the trades in a thorough, substantial, workmanlike manner by competent workmen, presenting a neat appearance when completed.
- C. Judgment: In all cases, the Engineer shall be the sole judge of the quality and equivalence of manufacturers, products, materials, and methods.
- D. Manufacturers/Products/Materials/Methods: Manufacturers, products, materials, and methods described in the various sections of the Specifications and indicated on the

Drawings are intended to establish a standard of quality only. It is not the intention of the Engineer to discriminate against any manufacturer, product, material, or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer shall not be interpreted to mean that the manufacturer's standard product will meet the requirements of the project design, Specifications, and space constraints.

1. Wherever a definite manufacturer, product, material, or method is specified and there is not a statement that another manufacturer, product, material, or method will be acceptable, it is the intention of the Engineer that the specified manufacturer, product, material, or method is the only one that shall be used without Prior Approval.
 2. Wherever a definite manufacturer, product, material, or method is specified as "NO SUBSTITUTE", it is the intention of the Engineer that the listed item is the only one acceptable.
- E. Alternate Manufacturers/Products/Materials/Methods: Products by Alternate reliable manufacturers, products, materials, or methods may be accepted provided they have equal capacity, construction, and performance.
1. Wherever a definite material or manufacturer's product is specified and the Specification states that products of listed manufacturers may be provided, it is the intention of the Engineer that Alternate products of manufacturers that are specified (i.e., listed) are the only products that will be acceptable and that products of non-listed manufacturers will not be considered for Substitution without Prior Approval.
- F. Substitute Manufacturers/Products/Materials/Methods: Products by Substitute reliable manufacturers, products, materials, or methods may be accepted provided they have equal capacity, construction, and performance.
1. Wherever the expression "Or Approved Equal" is used in the Contract Documents, it is the intention of the Engineer that Substitute manufacturers, products, materials, and methods may be used only with Prior Approval. Under no circumstances shall any Substitution of manufacturers, products, materials, or methods be made without the prior written approval of the Engineer.
- G. Coordination: Where Alternate or Substituted equipment is used on the project, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available, including all required Code and maintenance clearances, and to coordinate all equipment requirements and provisions with the System Design, all affected Divisions, and all other Contractors. Where the use of Alternate or Substitute materials affects the cost of provisions made by other Contractors, the Contractor providing the Alternate or Substitute shall be responsible for the other Contractor's cost adjustment. There shall be no additional cost to the Owner or Architect/Engineer due to the use or acceptance of any Alternate or Substitute manufacturer, product, material, or method.

1.9 PRIOR APPROVAL

- A. General: Contractors wishing to Substitute manufacturers, products, materials, or methods from those indicated, or specified, shall submit such requests to the Architect in writing ten (10) calendar days prior to the General Contractor's bid. Requests for Prior Approval sent directly to the Engineer will not be considered. Requests for permission to make Substitutions after that time will not be considered. An approved Substitution will receive a written approval only in the form of an issued Specification change.
- B. Submittal: Requests shall consist of two (2) sets of descriptive literature and performance data covering each item of equipment or material. The submittal shall include the following:
1. Name of the Architect, Engineer, Project, Sub-Contractor, and General Contractor.
 2. Reference to Specification Section and Page Number.
 3. A list of all variations from the Contract Document requirements.
 4. Dimensional drawings.
 5. Sufficient information on the specified product for which approval is sought. All technical performance data and construction materials shall be clearly noted.
- C. Samples: Provide, upon request of the Architect/Engineer, samples of materials and equipment for review.
- D. Conditions: The Contractor's Substitution request will be received and considered by the Architect/Engineer when the following conditions are satisfied:
1. Extensive revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of Contract Documents.
 3. The request is timely, fully documented, and properly submitted.
 4. The request is directly related to an "or equal" clause or similar language in the Contract Documents or as permitted in the section QUALITY ASSURANCE.
 5. One or more of the following conditions:
 - a. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 - b. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 - c. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation, or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect/Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
 - d. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.

- e. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
 - E. Shop Drawings, Product Data, and Samples: The Contractor's submittal and Engineer's acceptance of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for Substitution, nor does it constitute approval.
 - F. Division 1: The requirements for Prior Approval listed herein supersede the requirements for Substitutions listed in Division 1 of the Specifications.
- 1.10 CONFERENCE PRIOR TO START OF WORK
- A. Immediately upon the award of this Contract, but prior to commencing any Work, the Contractor, together with designated major subcontractors, shall confer with the Architect and Engineer concerning the Work under this Contract.
 - B. The conference will be at a mutually agreed place and acceptable time.
- 1.11 UTILITIES
- A. General: Location, inverts and sizes of water lines, gas lines, fire hydrants, sewer lines, manholes, capacity and voltage of electric lines, and location of telephone lines, etc., are shown if available. This data is accurate to the best knowledge of the Engineer.
 - B. Coordination: The Contractor shall be responsible for field verification of the actual location of site utilities and shall make modifications necessary for connection to or construction around those utilities at no additional cost to the Owner or Engineer.
 - C. Temporary Power Services:
 - 1. Temporary electrical power for construction operations shall be derived from a new temporary service from the Power Company. The Electrical Contractor shall provide the necessary conductors, connections, service switches, poles, protective devices, lighting fixtures, lamps, outlet devices, disconnect switches, etc., required for temporary lighting and single and three phase power of voltage levels required by the construction of the project.
 - 2. All such temporary equipment shall remain the property of the Contractor and shall be removed when permanent connections have been completed.
 - 3. Temporary connections shall be safe and in accordance with applicable codes. The Contractor shall be responsible for any damage or injury to equipment, materials, or personnel caused by improperly protected temporary installations.
 - 4. All costs for materials and installation for distribution of temporary electrical facilities shall be at the expense of the Electrical Contractor.
 - 5. No conductors, bus, nor any other electrical equipment which is part of the permanent electrical system may be used for temporary electrical service for construction operations, unless approved by the Architect/Engineer.
 - 6. Power Company costs for temporary and permanent power usage (during construction) until date of occupancy will be born by the General Contractor.

7. In addition, it is the responsibility of the Electrical Contractor to coordinate with the local power company the installation and activation of permanent power to the building, in a timely manner to avoid construction delays.

1.12 CHANGE ORDERS

- A. Refer to Division 1 for requirements concerning Change Orders.

1.13 ALTERNATES

- A. General: Refer to Division 1 for information concerning Alternates.

1.14 UNIT PRICES

- A. General: Refer to Bid Form for information on required Unit Prices.

1.15 SPACE LIMITATIONS

- A. General: Determine in advance of purchase that the equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearances for adjustments, repair, or replacement. Allow adequate space for clearance in accordance with requirements of the Code, local inspection department, and equipment manufacturer.
- B. Scheduled Equipment: The design shown on the Drawings is based on the equipment scheduled. Equipment has been chosen which will fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts, etc.
- C. Responsibility: Since space requirements and equipment arrangement vary according to each Manufacturer, the responsibility for initial access and proper fit rests with the Contractor.
- D. Review: Final arrangements of equipment to be installed shall be subject to Architect/Engineer review.

1.16 COORDINATION

- A. Each Contractor shall be responsible for the coordination of all items that will affect the installation of the Work of his Division. The coordination shall include, but not be limited to, voltage, ampacity, capacity, electrical/piping connections, structural supports, space requirements, locating devices in Architectural finish elements, staging the construction and building requirements, and special conditions.
- B. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other disciplines.

- C. Holes or other openings required in surfaces with special Architectural finishes (stone, cloth, finished wood, etc.) shall be reviewed and approved by the Owner or Architect prior to any cutting or drilling.

1.17 SHOP DRAWINGS AND SUBMITTALS

- A. General: After the Contract is awarded but prior to proceeding with the Work requiring Shop Drawing review, the Contractor shall obtain complete shop drawings and product data from the manufacturers, suppliers, vendors, and Sub-Contractors for all materials and equipment specified herein and make formal submission to the Architect. A minimum period of two (2) weeks should be allowed in the Construction Schedule for the Engineers review.
- B. Certification: Each Contractor responsible for the Work shall review and certify the shop drawing, submittal and/or product data to be in full compliance with the requirements of the Contract Documents.
- C. The Engineer's review of shop drawings and submittal data shall not relieve the Contractor of the responsibility for dimensions or errors that may be contained therein, or for deviations from any requirements of the Contract Documents. It shall be clearly understood that the Engineers noting some errors but overlooking some others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the shop drawing or product data, the Contract Documents shall govern the Work and are neither waived nor superseded in any way by the review of shop drawings, product data and samples.
- D. A SUBMITTAL SHALL NOT CONTAIN INFORMATION FROM MORE THAN ONE SPECIFICATION SECTION. A specification section can be subdivided into separate submittals for items that are listed in the section.
- E. Electronic Submittal: Each submittal shall contain the following items in a suitable electronic document or file:
 - 1. Electronic Submittals shall be sent to the Architect for distribution to the proper Design Team recipients.
 - 2. The Architect shall provide Electronic Submittals to Engineer at Submittals@wylieeng.com. Submittals sent to individual Wylie Engineers only will not be accepted.
 - 3. Electronic submittals shall be sent via email in searchable PDF form with electronic marks. At no point shall a submittal be printed and scanned prior to emailing. Submittals required to be printed for review are to be provided via hard copy. Submittals scanned from hard copies with handwritten marks are not acceptable.
 - 4. Any electronic submittals deemed not readable will be automatically rejected.
- F. Each submittal shall contain the following items:
 - 1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal.

2. The Specification Section Number or Drawing Reference Number covering the items being submitted and the product name or description.
 3. An index page listing all data within the submittal including the product name and description.
 4. A specification compliance review. This shall consist of a reproduction of the applicable specification section(s) from the contract documents. Each line in the specification shall be marked either "Comply", "Deviate", or "N/A", as appropriate. An explanation shall be provided for Deviate and N/A items.
 5. Dimensional data and actual sketches as applicable to show that the submitted equipment will fit into the space available with all required Code and maintenance clearances.
 6. Identification of each item of material or equipment matching that indicated on the Drawings.
 7. Sufficient performance data, capacity, sound data where applicable, diagrammatic data and descriptive information to show its compliance with the requirements of the Contract Documents. Any options or special requirements shall be clearly highlighted. All applicable information shall be clearly highlighted. All non-applicable data shall be crossed out.
- G. Submittals will be marked with one of the following levels of status:
1. NO EXCEPTIONS
 2. FURNISH AS NOTED
 3. REVISE AND RESUBMIT
 4. REJECTED AS NOTED
 5. NO ACTION
- H. NO EXCEPTIONS: The submittal was reviewed and general compliance with the design concept and general requirements of the Contract Documents was noted.
- I. FURNISH AS NOTED: The submittal was reviewed and found to have minor deviations from the requirements of the Contract Documents or missing information. The contractor shall correct deviations or missing information when ordering materials or equipment and shall provide a corrected submittal in the O&M Manual.
- J. REVISE AND RESUBMIT: The submittal was reviewed and major deviations from the requirements of the Contract Documents were noted. The shop drawing or product data shall be revised to eliminate the deviations. A complete resubmittal is required with a written response to each review comment.
- K. REJECTED AS NOTED: The submittal was found to be in direct conflict with the requirements of the Contract Documents and was not reviewed further. A complete submittal on the product specified is mandatory.
- L. NO ACTION: This status is assigned to O & M Manuals, Record Drawings, and non-applicable submittals made to the Engineer. Should there be comments with this status, the contractor shall address and satisfy them all via written correspondence.
- M. Materials and equipment which are purchased or installed without a "NO EXCEPTIONS" shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged

unsatisfactory by the Architect/Engineer for any reason shall be at the expense of the Contractor.

- N. Shop Drawings shall be complete and certified by the Contractor prior to submission to the Engineer for review. Where more than two reviews are required for a given submittal to obtain a status of "NO EXCEPTIONS", the owner shall be reimbursed by the Contractor for any expense in connection with more than the two submittals set forth herein.

1.18 CERTIFICATIONS AND TEST REPORTS

- A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submitted at least thirty (30) days before the projected project completion date.
- B. Test result reporting forms shall be submitted for review prior to submittal of the completion and test schedule.
- C. Submit an electronic copy of all certifications and test results to the Architect/Engineer for review in sufficient advance of the completion schedule to allow for any remedial work required to correct any deficiencies discovered in equipment and systems.
- D. Certifications and completed test reports to be submitted electronically, and shall include, but not be limited to those items outlined in Sections titled "Startup, Testing, Adjusting and Balancing", and "Testing".

1.19 OPERATING AND MAINTENANCE MANUALS

- A. Bind together electronically or in 3-ring binders, four (4) sets (if hard copy is selected) of all approved shop drawings, submittals, bulletins, wiring diagrams, and operating and maintenance instructions on every piece of equipment furnished under this Division. All Sections shall be organized into Sections, typed, labeled and indexed for ease of reference. All pertinent information required for proper operation and maintenance of equipment supplied by the respective Division shall be clearly and legibly written and shall be bound with the O & M's.
- B. The following information shall be provided for all equipment:
1. Identifying name, name tag designation and location of all equipment.
 2. Valve tag lists with valve number, type, location, service and color-coding.
 3. Fuse and motor heater size information.
 4. Equipment and motor nameplate data.
 5. Manuals shall only contain submittals with a status of "No Exceptions Taken" or have written responses.
 6. Fabrication drawings.
 7. Equipment and device bulletins and catalog cut sheets clearly highlighted to show pertinent information about the product installed in the Project. Include also all performance curves and capacity data.

8. Maintenance instructions clearly highlighted to show all required periodic maintenance and lubrication.
9. Wiring diagrams.
10. Operating instructions clearly highlighted.
11. Exploded parts views and parts lists for all equipment and devices.
12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
13. Vendor source name, address, and phone number for replacement parts.
14. Copies of all certified test results and other required certifications.
15. Color-coding charts for all painted equipment and conduit.
16. Operating and Maintenance Manuals shall be delivered to the Architect/Engineer at least fourteen (14) days prior to the beginning of the operator's training period.

1.20 RECORD DRAWINGS

- A. The Contractor shall maintain, on a daily basis, a complete set of black line record prints clearly stamped "Record Drawings" on the job site on which he shall note all details and alterations required to be made to meet actual site conditions and Changes made by Change Order notices. All deviations from the Contract Documents shall be noted on the Record Drawings. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or Work without definite instructions from the Architect. These drawings shall be kept available for inspection by the Architect/Engineer at all times. Refer to Division 1 for additional requirements concerning Record Drawings.
- B. The Record Drawings shall indicate accurate dimensions in two directions from a column for all buried or concealed Work and for recording any deviations from the Work indicated on the Contract Documents as a result of coordination.
- C. Within thirty (30) days of completion of the Work, the Contractor shall transfer all marks from the Record Drawings to a set of Record CAD or BIM files and shall submit the Record CAD or BIM files and three (3) sets of black line prints to the Architect/Engineer for review.
- D. The reproducible Record CAD or BIM files shall have the Engineer's name and seal completely removed. Each Drawing shall be marked with an impression identical to the example below and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS	
DATE:	_____
	(NAME OF GENERAL CONTRACTOR)
BY:	_____
	(NAME OF SUBCONTRACTOR)
BY:	_____

1.21 EXECUTION AND COORDINATION OF WORK

- A. The Drawings attempt to show reasonable indications of the locations of ductwork, piping, conduit, and equipment without always indicating elevations and dimensions. The Contractor shall perform field measurements of actual structural conditions prior to fabricating ductwork, piping, and conduit. All piping systems that require grading shall be coordinated with all trades. Exact locations of equipment and connections thereto shall be coordinated with "No Exceptions Taken" shop drawings, equipment drawings, rough-in drawings, building conditions and all other trades. Any reasonable changes in the locations indicated on the Contract Documents, up to a distance of three (3) feet, shall be made by the Contractor without any additional cost to the Owner.
- B. All ducts, pipes, and conduit, except those in the various equipment rooms, in unfinished spaces or where specifically designated herein or on the Drawings shall be run concealed in furrings, plenums and chases.
- C. Interferences with other trades shall be resolved by giving precedence to systems required to be sloped for drainage or proper operation. Where space requirements conflict, the following order of precedence shall be observed:
 - 1. Building lines.
 - 2. Structural members.
 - 3. Soil and drain piping.
 - 4. Steam and condensate piping.
 - 5. Sprinkler piping.
 - 6. Vent piping.
 - 7. Supply ductwork.
 - 8. Exhaust ductwork.
 - 9. HVAC water piping.
 - 10. Domestic water piping.
 - 11. Electrical conduit.
- D. Manufacturer's Recommendations: With exceptions as specified and/or indicated on the Drawings or in the Specifications, apply, install, erect, use, clean, and condition, manufactured articles, materials, and equipment per Manufacturer's current printed recommendations. Keep copies of such printed recommendations at job site and make them available as required.
- E. Architectural Approval: Devices exposed to occupant view or mounted on walls, ceilings, floors, etc. in finished spaces shall:
 - 1. Be located in exact locations shown on the Architectural Drawings or locations approved by the Architect.
 - 2. Have appearances acceptable to the Architect.

1.22 CONTRACTOR'S COORDINATION DRAWINGS/BUILDING INFORMATION MODEL (BIM)

- A. The Contractor shall coordinate efforts of all trades and shall furnish (in writing, with copies to the Architect and Owner) any information necessary to permit the Work of all trades to be installed satisfactorily and with the least possible interference or delay.

- B. The Contractor and all Subcontractors shall prepare a complete set of construction coordination drawings ("Coordination Drawings") indicating all of the equipment actually purchased and the exact routing and elevations for all lines such as piping, busway, conduit, ductwork, etc., including conduit embedded in concrete and openings, sleeves, etc., required in the structure, walls, partitions, etc. The Coordination Drawings shall be submitted complete for review to the Architect, Engineer and Owner in accordance with the specifications. The Coordination Drawing preparation and completion shall comply with the requirements of the Schedule. Prior to commencing the Work, the Subcontractor shall obtain from the Architect or Engineer the Building Information Model (BIM) file in Revit® and/or a set of AutoCAD compatible format Architectural and Engineering Drawings, to be used to produce the Coordination Drawings. The Subcontractor shall give to the Architect and Engineer a written release acceptable to the Architect and Engineer signed by a corporate officer of the Subcontractor, prior to receipt of the compact disks. The sheet metal Drawings, prepared on electronic media using BIM software at a scale not less than 1/4" = 1'-0", shall serve as the base Drawings to which all other Subcontractors will overlay and add their Work. The Mechanical Subcontractor shall be designated as the lead contractor in the development of the composite modeling process and shall be responsible for electronically incorporating the various trade models into the final composite Building Model. Each trade shall draw their Work on separate layers represented by individual colors. Each Coordination Drawing shall be completed and signed off by the other Subcontractors and the Contractor prior to the installation of the Work in the area covered by the specific Coordination Drawing. The Subcontractors Work shall be installed in accordance with the Shop Drawings and the Coordination Drawings and shall include the required maintenance access space and the code clearance space. If the Contractor allows one trade to install their Work before coordinating with the Work of other trades, the Contractor shall make necessary changes to correct the condition without extra cost to the Owner. The Coordination Drawings indicating piping, conduit, busway and equipment support points, and loads exceeding 1,000 lb. imposed on the building structure shall be submitted to the Architect for review and approval. The elevation, location, support points, static, dynamic and expansion forces and loads imposed on the structure at support and anchor points and the size of all lines shall be indicated. All beam penetrations, slab penetrations, and sleeves shall be indicated, sized and coordinated with all other Work. All required code clearance space and required maintenance access space shall be indicated and coordinated with all other work. All Work routed underground or embedded in concrete shall be indicated by dimension to column and building lines and shall be coordinated. This requirement for Coordination Drawings shall not be construed as authorization for the Contractor or Subcontractor to make any unauthorized changes to the Drawings. All space allocations shown on the Drawings shall be maintained, such as ceiling height, seven (7) inch high zone directly above the ceiling reserved for tenant build out and flexibility, chase walls, equipment room size, etc., unless prior written authorization is received from the Architect to change them. Prior to final acceptance of the Work, the Contractor shall give the BIM in Revit® or AutoCAD 3D 2018 or later compatible format on electronic media storage, containing the Contractor's coordination documentation, to the Owner.

1.23 SUPERVISION

- A. A competent Superintendent approved by the Architect/Engineer, shall be kept by the Contractor at the building to receive instructions and to act for the Contractor. Once the

Superintendent has been approved, no change shall be made without approval of Architect/Engineer. Representatives of the Owner, Architect/Engineer shall have the right to observe the work at any time. The Contractor shall have a representative available when his work is being observed and he shall give assistance as may be required to the Architect/Engineer's representative.

- B. The project shall be constructed by employees of the Contractor or by workers under his supervision. Any subcontractors employed by the Contractor shall be approved by the Owner's Representative. The Contractor shall be responsible for all equipment, material and work performed by any subcontractor.

1.24 SAFETY REGULATIONS

- A. All Work shall be performed in compliance with all applicable and governing safety regulations. All safety lights, guards and signs required for the performance of the Work shall be provided and operated by the respective Contractor.

1.25 STORAGE AND PROTECTION OF MATERIALS

- A. The Contractor shall properly store all material and equipment at the jobsite and protect it from the elements and from damage. Any equipment damaged due to improper protection shall be replaced by the Contractor at his expense.
- B. It shall be the responsibility of the Contractor to provide a watertight installation throughout the construction process.
- C. All large pieces of equipment which are to be installed in the building and which are too large to permit access through doorways, stairways or shafts shall be brought to the job by the Contractor and shall be placed in the spaces before enclosing structure is completed. All apparatus shall be cribbed up from the floor.
- D. The Contractor shall protect the work, equipment, and material of all other trades from damage by his work or other workmen and shall make good all damage thus caused.
- E. The Contractor shall be responsible for all work, materials, and equipment until finally inspected, tested, and accepted; protect work against theft, injury or damage; and carefully store material and equipment received on site which are not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material. The Contractor shall cover and protect in an acceptable manner to the Owner, all his equipment and materials from damage due to water, spray-on fireproofing, construction debris, etc.
- F. If any item of equipment is received prior to the time it is required, the Contractor shall be responsible for its proper storage and protection until such time as it may be required. The Contractor shall pay for all costs of demurrage or storage.

1.26 SCAFFOLDING

- A. The Contractor shall provide his own scaffolding and ladders to facilitate the necessary adjustment and balancing of the system.

1.27 DRAYAGE AND HAULING

- A. The Contractor shall keep the jobsite free from the accumulation of trash and construction debris, regardless of which subcontractor may be responsible.

1.28 EXCAVATION AND BACKFILL

- A. The Contractor shall make all necessary excavations, cutting of paving, concrete, etc., and do all backfilling and temporary patch type paving repairs necessary for the proper execution of the Work. Remove all dirt and debris out and away from the building as directed.
- B. Backfill shall be compacted and repairs to paving or concrete shall be accomplished to the satisfaction of the Architect and the Local Authorities having jurisdiction.

1.29 SLEEVES, CUTTING, PATCHING AND FIRESAFING

- A. Where it becomes necessary to cut through any wall, floor or ceiling to permit the installation of any Work, or to repair any defects that may appear, the cutting shall be performed under the supervision of the General Contractor. Inform the Owner's representative before any work commences. No structural member shall be altered without the written permission of the Structural Engineer.
- B. The Contractor shall be responsible for the timely placing of sleeves for all piping passing through walls, partitions, beams, floors, and roofs while the same are under construction.
- C. Seal all material and system support penetrations of fire rated construction with factory-built devices or with manufactured fill, void or cavity materials "Classified" by Underwriter's Laboratories, Inc. for use as a Through-Penetration Firestop.
- D. If holes and/or sleeves are not properly installed and cutting and patching becomes necessary, it shall be done at no additional expense to the Owner.
- E. Unused sleeves shall be sealed with fire-stop devices and systems to maintain the fire rating of the construction penetrated.
- F. This Contractor shall be responsible for patching fire proofing on steel and concrete structural members where it has been removed or disturbed for the installation of his hangers, braces or brackets.

1.30 LUBRICATION

- A. All equipment shall be properly filled with lubricating oil prior to initial startup.
- B. All parts of equipment requiring the regular preventive maintenance of lubrication shall be equipped with an appropriate Zerk fitting and/or extension tube to an accessible location.

1.31 EQUIPMENT NOISE AND VIBRATION

- A. It is the intent to specify and for the Contractor to install systems that are quiet and free of vibration. Equipment shall be balanced, and vibration isolated to meet the requirements specified herein for both the equipment itself and conditions within occupied spaces. Each Contractor is responsible for obtaining and installing equipment that is quiet in operation as compared to other available equipment of its size, capacity, and type.
- B. Equipment not meeting these requirements shall be corrected by the Contractor to an acceptable level but within the requirements of the Specifications at no cost to the Owner, Architect or Engineer.
- C. Air distribution equipment shall be sound tested at the design operating conditions and shall not exceed an NC of 35 at rated CFM.
- D. Noise Level: Unless noted otherwise herein or on the Drawings, the noise level in all occupied spaces shall not exceed the "lowest value in the range" of the noise criteria curves published in the current Fundamentals edition of the ASHRAE Guide and Data Book. The noise criteria curves shall be based on ANSI Standard S1.6-1967 octave bands and a sound pressure level in decibels referenced to 0.002 microbars. Sound levels in occupied spaces must meet the design criteria with all construction in place.
- E. Verification: Should a question arise regarding the acceptable level of noise or vibration in a particular space or piece of equipment, the Contractor shall be responsible for providing the services of an approved acoustical consultant to determine actual noise/vibration conditions.

1.32 START-UP

- A. The Contractor shall furnish the services of factory-trained specialists to supervise the installation and start-up of all major systems and equipment.

1.33 FINAL COMPLETION AND TESTING

- A. Near the completion of the Work, all equipment and systems specified herein to receive individual testing shall be demonstrated by the Contractor to the Engineer to operate in accordance with the requirements of the Contract Documents. Should any piece of equipment fail to meet those requirements, it shall be either repaired in a timely manner or replaced.
- B. The date for the final acceptance test shall be sufficiently in advance of the Contract completion date to permit the execution of the test and make any remedial repairs prior to the expiration of the Contract. Any adjustments and/or alterations that the final acceptance tests indicate as necessary for the proper functioning of all equipment shall be completed prior to the expiration of the Contract. Retests shall not relieve the Contractor of completion data responsibility. See individual Sections and Sections titled "Startup, Testing, Adjusting and Balancing", and "Testing", for extent of testing required.
- C. The Contractor shall provide a detailed schedule of completion indicating when each system is to be completed and outlining when tests will be performed. Completion

schedule shall be submitted for review at least thirty (30) days prior to the anticipated project completion date.

- D. Replace all air filters immediately prior to final acceptance by the Owner.
- E. Equipment and material shall satisfactorily serve continuous loads.
- F. Clean all new lighting fixtures and diffusers immediately prior to final acceptance.
- G. Touch up and/or refinish all scratched equipment and devices immediately prior to final acceptance by the Owner.

1.34 OPERATOR INSTRUCTIONS

- A. The Contractor shall provide the services of factory trained specialists to supervise the installation, start-up, testing, and operation of major equipment and systems as specified herein and in other individual specification Sections and to instruct the Owner's operators for a five-day operating instruction period. The operating instruction period shall be defined as straight time working hours and shall not include nights, weekends, or travel time to and/or from the Project. See individual Specification Sections for additional instructions by Manufacturer's trained specialists.
- B. The Owner shall be notified in writing at least five (5) days before each operating instruction period begins. The Contractor shall commence no instruction period until the Owner has issued his written acceptance of the starting time.

1.35 FINAL REVIEW

- A. At a time, designated, the entire system shall be reviewed for compliance with the Contract Drawings and Specifications. The Contractor shall be present at this review.
- B. The entire system shall be operating properly with all systems balanced and all controls adjusted.
- C. Certificates and Documents required herein shall be in order and presented to the Architect at least two (2) weeks prior to the review.
- D. After the review, any changes or corrections noted as necessary for the Work to comply with these Specifications and the Drawings shall be accomplished without delay in order to secure final acceptance of the Work.

1.36 WARRANTIES AND GUARANTEES

- A. General: Contractor shall guarantee all material and equipment installed by him against defects in workmanship and material for a period of twelve (12) months after final acceptance of the Work by the Owner, and he shall repair or replace any materials or equipment developing such defects within that time, promptly on due notice given him by the Owner and at Contractor's sole cost and expense.
- B. Equipment: All equipment bearing a manufacturer's guarantee shall be construed to have an extended guarantee to the Owner by the manufacturer. Any such equipment

that proves defective in materials or workmanship within the guarantee period is to be replaced by the Contractor in accordance with the manufacturer's guarantee.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Submittals shall include, but not be limited to the following:

1. List of proposed manufacturers and subcontractors for major equipment and systems.
2. Test Result Reporting Forms.
3. Detailed completion and test schedule.
4. Operating and maintenance manuals.
5. Record drawings.
6. Operator instruction schedule.

END OF SECTION

SECTION 20 05 04

SCHEDULE OF SUBMITTAL DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05

1.2 SCOPE

- A. Furnish submittals consisting of shop drawings, product data, brochures, samples, etc., as indicated on the Drawings, as specified herein, and as required by other sections of these specifications.

1.3 SUBMITTALS REQUIRED

- A. The submittals to be furnished for this Project shall comply with the Specifications herein. The referenced Sections scheduled here are for general information purposes only and shall not be construed to be limiting to the submittal data scheduled and/or required within the individual Sections of these Specifications.
- B. Division 20 Submittals are required for, but not limited to, the following items:
 - 1. 20 05 05.....GENERAL DIVISION 20-28 MATERIALS AND METHODS
 - 2. 20 05 06.....OWNER AND CONTRACTOR FURNISHED EQUIPMENT
 - 3. 20 05 08.....DEMOLITION AND WORK WITHIN EXISTING BUILDINGS
 - 4. 20 05 13.....MOTORS AND CONTROLLERS
 - 5. 20 05 14.....ELECTRONIC VARIABLE SPEED DRIVES
 - 6. 20 05 48.....NOISE AND VIBRATION ISOLATION
 - 7. 20 07 00.....THERMAL INSULATION
 - 8. 20 08 00.....COMMISSIONING
 - 9. 20 21 16.....MISCELLANEOUS PIPING
- C. Division 22 Submittals are required for, but not limited to, the following items:
 - 1. 22 05 01.....SCOPE OF WORK
 - 2. 22 11 16.....PLUMBING PIPING AND ACCESSORIES
- D. Division 23 Submittals are required for, but not limited to, the following items:
 - 1. 23 05 10.....HVAC WATER PIPING ACCESSORIES

2. 23 05 25.....MISCELLANEOUS EQUIPMENT
3. 23 05 93.....START-UP, TESTING, ADJUSTING AND BALANCING
4. 23 21 13.....HVAC WATER PIPING
5. 23 21 23.....HVAC PUMPS
6. 23 31 13.....DUCTWORK AND SHEET METAL
7. 23 33 10.....AIR DISTRIBUTION DEVICES AND DAMPERS
8. 23 34 10.....FANS
9. 23 36 00.....AIR TERMINAL UNITS
10. 23 41 10.....AIR FILTERING
11. 23 65 19.....COOLING TOWERS - STEEL
12. 23 73 00.....AIR HANDLING UNITS
13. 23 81 14 PACKAGED ROOF MOUNTED AIR CONDITIONING UNITS

E. Division 25 Submittals are required for, but not limited to, the following items:

1. 25 09 01.....INSTALLATION, TESTING, AND TRAINING
2. 25 09 02.....PANELS AND CONTROLLERS
3. 25 09 03.....DAMPERS, VALVES AND ELECTRONIC CONTROL AND
.....AUTOMATION HARDWARE

F. Division 26 Submittals are required for, but not limited to, the following items:

1. 26 05 07.....TESTING
2. 26 05 19.....CONDUCTORS
3. 26 05 23.....MOTOR AND CONTROL WIRING
4. 26 05 26.....GROUNDING
5. 26 05 33.....CONDUIT
6. 26 05 34.....OUTLET BOXES
7. 26 24 16.....CIRCUIT BREAKER DISTRIBUTION PANELS
8. 26 24 17.....CIRCUIT BREAKER LIGHTING AND POWER PANELBOARDS
9. 26 27 26.....WIRING DEVICES
10. 26 28 13.....FUSES
11. 26 28 16.16....SAFETY AND DISCONNECT SWITCHES

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 20 05 05

GENERAL DIVISION 20 MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. Demolition and Work Within Existing Buildings - Section 20 05 08
- C. Requirements of Division 20 apply to all Work of Divisions 20-28.

1.2 SCOPE

- A. Provide and install general Division 20-28 materials and methods as shown, scheduled, specified, and required.

PART 2 - PRODUCTS

2.1 PIPING SYSTEM MATERIALS

- A. Refer to other Division 21-28 Sections.

2.2 PIPE HANGERS AND SUPPORTS

- A. Refer to Section 20 05 05, Part 3, Execution.

2.3 CABINETS AND PULL BOXES

- A. Refer to Section 20 05 05, Part 3, Execution.

2.4 PIPE CLEANING AND STERILIZATION CHEMICALS

- A. Refer to Section 20 05 05, Part 3, Execution.

2.5 SLEEVES

- A. Refer to Section 20 05 05, Part 3, Execution.

2.6 FIRESTOP DEVICES, SYSTEMS, AND MATERIALS

- A. Refer to Section 20 05 05, Part 3, Execution.

2.7 EQUIPMENT PADS

- A. Refer to Section 20 05 05, Part 3, Execution.

2.8 ACCESS DOORS

- A. Refer to Section 20 05 05, Part 3, Execution.

2.9 CURBS AND SUPPORTS

- A. Refer to Section 20 05 05, Part 3, Execution.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Erection: Piping shall be properly supported, and adequate provisions shall be made for expansion, contraction, slope and anchorage. Piping measurements are the responsibility of the Piping Contractor. Piping shall be worked into place without springing or forcing. All pipes shall have burr and cutting slag removed by reaming or other approved cleaning methods. All changes in direction shall be made with fittings.
- B. Concealed and Exposed Piping: All piping in finished areas shall be concealed, unless otherwise noted. Piping exposed in mechanical rooms and other locations as noted shall be installed in an orderly manner and parallel with or perpendicular to building lines. Exposed piping in occupied areas shall be routed tight to the structure or as high as is possible.
- C. Electrical Equipment and Electrical Room Precautions: In general, Contractor shall not install piping for heating, refrigeration, plumbing, fire protection, process piping, or any piping systems not included as part of the electrical work, in any switchgear, transformer, elevator equipment, telephone, or electrical equipment room. No piping shall be installed above switchboards, panelboards, control panels, motor control centers, individual motor controllers, etc.
- D. Grading: All piping shall be carefully installed so as to eliminate traps and pockets in pressurized lines and to maintain flow in gravity flow lines. Where air pockets and traps cannot be avoided, provide valved hose connections for water traps and valved automatic air vents for air traps. The Contractor shall consider the pipe grading requirements when coordinating pipe routing for the project. Pipe slope shall be maintained throughout the project. Waste and vent piping shall be sloped in accordance with applicable codes. Pressurized plumbing piping systems shall be sloped to drain points. HVAC water piping systems shall be graded up 1/16" per 10 lineal foot of horizontal run to air vent locations and down 1/16" per 10 lineal feet of horizontal run to drain locations.
- E. Arrangement: Flanges or unions, shall be provided in the piping at connections to all items of equipment. All valves and specialties shall be placed to permit easy and proper operation and access, and all valves shall be regulated, packed and glands adjusted at

the completion of the work before final acceptance. Eccentric reducers shall be used wherever changes in pipe sizes occur in horizontal mains. The use of bull head tees or other high pressure drop configurations will not be permitted. Devices installed in the piping systems such as thermowells, gages, etc., shall be installed in positions such that any condensation will drip away from, not into the insulation.

- F. Welding: All welded joints on piping shall be continuous metallic arc or gas fusion welds connecting pipe ends which are beveled to 37-1/2 degrees before welding. The use of backing rings will not be acceptable. All taps shall be made using proper weld fitting. No "burn-ins" will be allowed. Gas torch cuts shall be true and free from burned metal. Clean pipe surfaces to be welded immediately prior to welding. Welded pipe joints shall be properly aligned with no weld material or bead projection into the pipe. All weld procedures shall be in accordance with requirements of the American Welding Society and shall be performed by certified welders. Documentation of welder certification shall be available if requested. All welding operations shall conform to the latest recommendations of the American Welding Society and to ASME B31.9 Piping Code. All qualifying tests, welding and stress relieving procedures, shall, moreover, be in accord with Standard Qualification for WELDING PROCEDURES, WELDERS AND WELDING OPERATORS, APPENDIX A, SECTION 6 of the Code, current edition. In no cases shall Schedule 40 pipe be welded with less than three passes including one tack, one filler, and one lacer. Schedule 80 pipe shall be welded with not less than four passes including one tack, two fillers and one lacer. Welds lacking penetration shall be removed. Internal and external cracks shall be ground down and removed. Finished welds shall be buffed and spray painted with lacquer.

1. All weld fittings shall be factory made wrought carbon steel butt-welding fittings conforming to ASTM A234 and ASME/ANSI B16.9 latest edition, as made by Anvil, Tube Turn, Hackney, Taylor Forge, or Ladish Company. Long radius fittings shall be provided for all 90 degree and 45-degree elbows. Each fitting shall be stamped as specified by ASME/ANSI B16.9 and, in addition, shall have the laboratory control number metal stenciled on each fitting for ready reference as to physical properties required for any fitting selected at random. Complete test reports may be required for any fittings selected at random. Only one manufacturer of weld fittings will be approved for each project. Fittings that have been machined, remarked, or painted will not be acceptable. Each fitting shall have the manufacturer's trademark permanently identified in accordance with MSS SP-25. Markings shall be placed on the fittings at the farthest point from the edge to be welded to prevent disfiguring from the welding process.
2. Piping and fittings shall be welded and fabricated in accordance with ASME/ANSI and the latest edition of Standard B31.9 from the Code for Pressure Piping for all systems. Machine beveling in shop is preferred. Field beveling may be done by flame cutting to recognized standards.
3. Ensure complete penetration of deposited metal with base metal. Contractor shall provide filler metal suitable for use with base metal. Keep inside of fittings free from globules of weld metal.
4. Align piping and equipment so that no part is offset more than 1/16". Set all fittings and joints square and true and preserve alignment during welding operation. Use of alignment rods inside pipe is prohibited.
5. Do not permit any weld to project within the pipe so as to restrict it. Tack welds, if used, must be of the same material and made by the same procedure as the completed weld, otherwise, remove tack welds during welding operation.

6. Contractor shall not split, bend, flatten or otherwise damage piping before, during or after installation. Remove dirt, scale, and other foreign matter from inside piping before tying in sections, fittings, valves or equipment.
 7. In no case shall Schedule 40 pipe be welded with less than three passes including one stringer/root, one filler and one lacer. Schedule 80 pipe shall be welded with not less than four passes including one stringer/root, two fillers and one lacer. In all cases, however, the weld must be filled before the cap weld is added.
 8. All welds are subject to visual inspection for compliance with specifications. The Owner will, at the Owners option, provide employees or employ a testing laboratory for the purposes of performing said inspections and/or X-ray testing. Initial visual and X-ray inspections will be provided by the Owner. The Contractor shall be responsible for all labor, material and travel expenses involved in the re-inspection and retesting of any welds found to be unacceptable. In addition, the Contractor shall be responsible for the costs involved in any and all additional testing required or recommended by ASME/ANSI Standards due to the discovery of poor, unacceptable, or rejected welds.
 9. Welds lacking penetration, containing excessive porosity of cracks, or is found to be unacceptable for any reason, must be removed and replaced with an original quality weld as specified herein. All qualifying tests, welding, and stress relieving procedures shall, moreover, be in accord with Standard Qualification for Welding Procedures, Welders and Welding Operators, Appendix A, Section 6 of the Code, current edition.
- G. Screw Pipe Fittings: All screw joints shall be made with taper threads, properly cut. Joints shall be made tight with Teflon applied to the pipe threads only and not to fittings. When threads are cut on pipes, the ends shall be carefully reamed to remove any burrs. Before installing pipe that has been cut and threaded, the lengths of pipe shall be upended and hammered to remove all shavings and foreign material.
- H. Assembling Other Joints: Procedures for assembling joints in cast iron and copper lines have been set forth elsewhere in these Specifications. For any special materials, consult the manufacturers for the recommended procedures in assembling the joints.
- I. Expansion and Contraction: Expansion and contraction of piping shall be provided by expansion loops, bends, or expansion joints, to prevent injury to connections, piping, equipment or the elements of the building. Pipe guides shall be provided and installed on piping as shown on Drawings and as necessary to properly fulfill function of expansion loops.
- J. Anchors: Pipe anchors shall be provided and installed at each end of piping runs which require expansion loops or joints, and where indicated on Drawings. Anchors shall be fabricated of rigid structural steel members firmly secured to the building structure.
- K. Escutcheons: Spring clamp plate escutcheons shall be provided where pipes are exposed in finished locations of the building and run through walls, floors, or ceilings. Plates shall be chrome plated spun brass of plain or approved pattern and shall be set tight on the pipe and to the building surface.
- L. Unions: Shall be installed on all bypasses, ahead of all traps, at all connections to equipment, where shown on the Drawings and where required to facilitate removal of

equipment. Unions shall also be provided in welded lines at the connections to items of equipment, where equipment flanges are not provided. Unions in steel lines assembled with screwed fittings shall be malleable iron screwed pattern unions with bronze seats. Unions in copper or brass lines shall be all brass, threaded pattern unions. Where unions are required by the above in steel lines assembled by welding, they shall consist of two mating welding flanges.

- M. Protection: All open ends of pipes and equipment shall be properly capped or plugged during construction to keep dirt and other foreign materials out of the system. Plugs of rags, wool, cotton, waste or similar materials are not acceptable.
- N. Dissimilar Pipe Materials: Connections between copper and steel pipes shall be made with dielectric couplings, flanged dielectric unions, or nylon bushings temperature and pressure rated for the service at the point of installation. Connections between copper and steel pipes shall be located in accessible locations or access shall be provided by the installation of access doors.

3.2 HANGERS AND SUPPORTS

- A. General: Provide pipe and conduit hangers and support materials as specified herein. All horizontal and vertical piping shall be thoroughly and substantially supported in accordance with ASME B31.9 Standard Code for Pressure Piping and Manufacturers' Standardization Society MSS SP-69 Pipe Hangers and Supports - Selection and Application. The design, type, spacing and application of all hangers, supports, anchors and guides shall comply with the above standards. Hanger rods shall be galvanized, or cadmium plated. Hanger rod clamps and inserts shall be as recommended by the clamp or insert manufacturer for the intended use and shall be approved in writing by the Structural Engineer. All methods of attachment to the structure and the use of after-set inserts shall be approved in writing by the Structural Engineer. The load and spacing on each hanger and/or insert shall not exceed the safe allowable load for any component of the support system, including the concrete that holds the inserts. Reinforcement at inserts shall be provided as required to develop the strength required. The Contractor shall patch fireproofing on steel and concrete structural members where it has been removed or disturbed for the installation of his hangers, braces, or brackets, etc.
- B. MSS Standard Compliance: Provide pipe hangers and supports of materials, design, and manufacture which comply with ANSI/MSS SP-58, SP-59, SP-69, SP-89, and SP-90.
- C. Acceptable Manufacturers: The model numbers listed in the Specification establish a level of quality and material. The following manufactures are acceptable subject to compliance with the requirements of this Specification:
 - 1. Anvil International
 - 2. B-Line
 - 3. Central Iron Manufacturing Company
 - 4. F & S Manufacturing Company
 - 5. The Michigan Hanger Company

- D. Inserts: Provide Anvil Fig. 282 or equal inserts for all pipe and equipment suspended from new concrete construction. Where inserts are placed in the bottom faces of concrete joists which are too narrow to provide adequate strength of concrete to hold insert properly or where a larger insert would require displacement of the bottom joist steel, the hanger rod shall be suspended from the center of a horizontal angle iron, channel iron, I-beam, and similar items spanning across two adjacent joists. The horizontal support shall be bolted to nonadjustable concrete inserts of the "spot" type, of physical size small enough to avoid the bottom joist steel.
- E. Fasteners: Fastening of pipes, conduits, and similar items in the building shall be as follows: To wood members - by wood screw; to masonry - by threaded metal expansion screws, or welding (when specifically permitted or directed), or bolts, and to new concrete by suitable insert anchored to reinforcing steel and poured in place unless other means are indicated on the plans. Power-actuated fasteners (shooting) will not be acceptable under any circumstances.
- F. Piping in Multiple Parallel Runs: Provide structural channels or angles with Anvil Fig. 137 or equal U-bolt clamps, supported as trapeze hangers where multiple parallel runs of piping are shown. Select and size members for weights to be carried and span dimensions between supports.
- G. Piping in Single Runs: Provide Anvil Fig. 260 or equal adjustable clevis hangers with a nut above and below the hanger on the hanger rod.
- H. Copper Pipe Hangers: Hangers supporting and contacting brass or copper lines 3" in size and smaller shall be Anvil Fig. CT 99C or equal, adjustable plastic-coated copper-plated tubing rings. Hangers supporting and contacting brass or copper lines 4" and larger shall be Anvil Fig. 260 or equal, adjustable clevis, with a nut above and below the hanger, and approved neoprene isolating material between pipe (or tubing) and hanger on the support rod. For insulated copper or brass domestic water lines, hangers for all sizes of pipe shall be Anvil Fig. 300 or equal, adjustable clevis, with a nut above and below the hanger, and approved neoprene isolating material between pipe (or tubing) and hanger on the support rod. Isolate all copper or brass lines from ferrous metals with electrical tape or other dielectric materials to prevent electrolytic action.
- I. Hanger Rod: Provide cadmium-coated or galvanized hanger rods of required length. All hanger rods shall be trimmed neatly so that no more than one inch (1") of excess hanger rod protrudes beyond the hanger nut. In the event a rod is intentionally but temporarily left excessively long (for slope or insulated lines for example), the Contractor shall take appropriate measures to protect the pipe or other materials from damage. Rod diameters shall be as follows:

PIPE SIZES	ROD DIAMETER
3/4" - 2"	3/8"
2-1/2" - 3"	1/2"
4" - 5"	5/8"
6"	3/4"
8" - 12"	7/8"
14" - 18"	1"

- J. Riser Clamps: Provide Anvil Fig. 261 or equal riser clamps with equal bearing on each end. Riser clamps for copper-plated tube shall be copper-plated.
- K. Pipe Supports in Chases and Partitions: Horizontal and vertical piping in chases and partitions, shall be supported by hangers or other suitable support. Pipes serving plumbing fixtures and equipment shall be securely supported near the point where pipes penetrate the finish wall. Supports shall be steel plate, angles or special channels such as Unistrut mounted in vertical or horizontal position. Pipe clamps such as Unistrut P2426, P2008, P1109 or other approved clamps shall be attached to supports. Supports shall be attached to wall or floor construction with clip angles, brackets, or other approved methods. Supports may be attached to cast iron pipe with pipe clamp or other approved method.
- L. Saddles and Shields:
1. Saddles for Horizontal Insulated Piping Without Vapor Barrier: At each hanger or support on horizontal runs, provide Anvil Fig. 160 or equal saddles, as applicable. Shields as described below may be used instead of the saddles. On heating water systems below 140°F (60°C), hangers may be sized for the pipe size and of material compatible with the pipe. Where dissimilar materials are used, provide dielectric separation. Carry insulation over hanger and seal where hanger is sized for pipe.
 2. Shields for Horizontal Insulated Water Piping with Vapor Barrier: At each hanger or support for water piping, provide a half section of preformed cellular glass or rigid calcium silicate blocking, with jacket of adjacent insulation brought across unbroken, supported on Anvil Fig. 167 or equal semicircular galvanized steel shields. Shields for pipe 4" and smaller shall be 12" long; shields for pipe 5 to 8" shall be 18" long; and shields for larger pipe shall be 24" long.
- M. Roller Supports: Provide Anvil Fig. 177 or equal adjustable pipe roll supports for support of horizontal piping installed in racks, beam supports, and where shown on the Drawings.
- N. Independent Support: Support fire sprinkler and standpipe piping independently of other piping in accordance with NFPA-approved methods and local codes and standards, using UL-listed and labeled support components.
- O. Provisions for Movement:
1. Movement: Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate the action of expansion joints, expansion loops, expansion bends, and similar units.
 2. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to any pipe or connected equipment. Pipe supports shall properly transmit the weight of the pipe and its contents to the building structure, or to independent posts, piers, or foundations.
 3. Pipe Slopes: Install hangers and supports to provide the indicated pipe slopes so maximum pipe deflections allowed by ANSI B31 are not exceeded.

- P. **Spacing:** Install hangers and supports in piping systems to remove stress from equipment flanges and rotating equipment. The following table gives maximum hanger spacing for copper and steel lines. Hangers shall be more closely spaced where required by the conditions of the installation in order to prevent sagging, excess load on structure and hangers, undue strain on equipment, noise transmission, etc. A hanger shall be placed within 2' of each elbow or tee with a minimum support of one hanger per joint or fitting and at each rise, drop, and trap. Maximum hanger and support spacing shall be as follows:

METALLIC TRADE PIPE SIZE*	MAXIMUM SPACING
1/2"	5'
3/4"	6'
1" AND 1-1/4"	7'
1-1/2"	9'
2"	10'
2-1/2"	11'
3"	12'
4"	14'
5"	16'
6"	17'
8"	19'
10"	22'
12"	23'
14"	25'
16"	27'
18"	28'

*Includes all sizes of cast iron and non-metallic piping. Provide rolled sheet metal pipe shields at hangers required to prevent any visible non-metallic pipe sag between hangers.

OR

- Q. **Spacing:** Install hangers and supports in piping systems to remove stress from equipment flanges and rotating equipment. The following table gives maximum hanger spacing for CPVC lines. Hangers shall be more closely spaced where required by the conditions of the installation in order to prevent sagging, excess load on structure and hangers, undue strain on equipment, noise transmission, etc. A hanger shall be placed within 6' of each elbow or tee with a minimum support of one hanger per joint or fitting and at each rise, drop, and trap. Maximum hanger and support spacing shall be as follows:

METALLIC TRADE PIPE SIZE*	MAXIMUM SPACING
1/2"	4'
3/4"	4'
1" AND 1-1/4"	5'
1-1/2"	5'
2"	6'
2-1/2"	6'
3"	6'

METALLIC TRADE PIPE SIZE*	MAXIMUM SPACING
4"	6'

*Includes all sizes of cast iron and non-metallic piping. Provide rolled sheet metal pipe shields at hangers required to prevent any visible non-metallic pipe sag between hangers.

- R. Guides: Install pipe guides complying with the manufacturers published product literature. Where not otherwise indicated install pipe guides near expansion loops, expansion joints, and ball joints.
- S. Anchors: Install anchors at the proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent the transfer of loading and stresses to connected equipment. Anchors shall include vibration isolation in accordance with the pipe support system specified. Where the piping system is floating, the anchors shall be termed restraints or braces.
1. Where expansion compensators are indicated, install anchors in accordance with the expansion unit manufacturers written instructions, to limit movement of piping and forces to the maximums recommended by the manufacturer of each unit.
 2. Where not otherwise indicated, install anchors at the ends of principal pipe runs and at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.
- T. Leveling: Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.
- U. Hangers: Refer to Section 20 05 48, Noise and Vibration Isolation, for additional information and support requirements. Pipe hangers made of wood, wire, or sheet iron shall not be permitted.
- V. Non-Isolated Riser Supports: Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents.
1. Cast iron soil pipe shall be supported at the base and at each story level, but in no case at intervals greater than 10 ft.
 2. Steel pipe shall be supported at the base and at not less than every other story level, but in no case at intervals greater than 25 ft., except that grooved-piping system shall be supported at each pipe section.
 3. Copper tube shall be supported at each story level, but in no case at intervals greater than 10 ft.
 4. CPVC pipe shall be supported at each floor level with mid-level guide.
- W. Miscellaneous Steel: All miscellaneous steel required for pipe and duct supports, anchors, guides, and similar items shall be galvanized for indoor use or hot dipped galvanized for outdoor use and where exposed to ambient conditions and shall be sized and provided by the Mechanical Contractor unless specifically indicated to be provided by others. The support members and their connection to the building structure shall be designed by a registered professional Structural Engineer.

- X. Finish: All steel and iron hangers for piping including clevis hangers, rods, inserts, clamps, stanchions, brackets, etc., shall be hot dip galvanized after fabrication for exterior applications and interior applications that are not in an air-conditioned space or air-conditioned return air plenum. Rods shall be electro-galvanized, or cadmium plated after threading for indoor applications and hot dip galvanized after fabrication for outdoor applications. Universal concrete inserts shall be hot dip galvanized.

3.3 PIPE CLEANING AND STERILIZATION

- A. HVAC Piping: All HVAC piping shall be cleaned following pressure testing of pipe. Piping shall be completely drained following pressure testing and then filled with clear water and alkaline pipe cleaning treatment (Garratt-Callahan Company 247-L or approved equal) to the suppliers recommended concentration. Provide copies of chemical treatment MSDS Sheets to the Owner. The system shall then be circulated per the supplier's recommendations. Following cleaning, each system shall be drained, refilled, and then continuously flushed until clean water is obtained. All strainers shall be cleaned prior to the system's final operation. Building pumps shall not be used for system flushing or cleaning. All pumps, piping, valves, fittings, etc. needed for flushing, filling and draining, shall be provided as required. After the system has been pressure tested, treated with pipe cleaning treatment and rinsed with clear water to remove the cleaning treatment, a 5 micron in-line filter may be installed in the system, in lieu of continuous water flushing, to clear the piping of construction debris. Each system being filtered shall be pumped continuously and the filter shall be cleaned once every 24 hours until no visible filtered matter is present in the filter after 24 hours of circulation. After the cleaning process is complete, the filters shall be removed from the system and all strainers shall be cleaned prior to putting the piping system into operation.
- B. Potable Water Piping: All potable water piping system components shall, after pressure testing, be thoroughly flushed with clear water and then sterilized. Sterilization shall be with either liquid chlorine or chlorine gas of adequate volume to give a concentration of 50 ppm based upon the volume of the system being treated. A minimum residual chlorine level of 5 ppm shall remain in each system for a minimum of 24 hours. After sterilization, all piping shall be thoroughly flushed. The above are minimum requirements and all sterilization procedures shall be in strict accordance with all local codes and authorities having jurisdiction.
- C. Fire Suppression Water Piping: All fire suppression water piping system components shall, after pressure testing, be thoroughly flushed with clear water.

3.4 SLEEVES

- A. General: This Contractor shall be responsible for the timely placement of sleeves in construction. If sleeves are not placed during construction, this contractor shall secure written permission to perform a core drill or cut and patch installation at no cost to the Owner. No piping shall pass through obstructions without sleeves, unless noted otherwise. Furnish and install sleeves around all piping passing through masonry, CMU and concrete walls and partitions, suspended slabs, plaster or drywall ceilings, structural members, other building features and where shown on the drawings.
- B. Partitions: Sleeves shall be required for piping passing through rated drywall and plaster partitions where required by the U.L. Classification for the Through-Penetration Firestop

used. Sleeves shall be installed in accordance with the Firestop U.L. Classification. Sleeves are not required for piping passing through non-rated drywall or plaster partitions. Non-isolated piping shall be mudded in and isolated piping shall have the opening mudded to within 1/2" of the pipe and an elastomeric caulk shall be installed in the opening around the pipe or insulation. Sleeves shall be secured to partitions as required by local Codes.

- C. Storm, Waste, and Vent Piping: Sleeves shall not be required for storm, waste or vent piping through slabs on grade or for piping passing through precast structure. Where piping passes vertically through pre-cast structures without sleeving, adequate provisions shall be made to prevent water leakage through slabs where applicable.
- D. Sizing Sleeves: Sleeves shall be one size larger than the pipe passing through the sleeve, except where larger sizes are required for mechanical seals. Where insulated piping passes through non-fire rated construction, sleeves shall be one size larger than the outside diameter of the insulation. All sleeves in floors shall extend 2 inches above the finished floor. Do not cut fire stop assemblies, such as ProSet or Hilti cast-in devices, off flush at slab level.
- E. Materials:
1. Non-Supporting Vertical Construction: Provide minimum 18-gauge galvanized steel sleeves.
 2. Non-Supporting Horizontal Construction: Provide minimum 16-gauge galvanized steel sleeves.
 3. Horizontal Construction Supporting Risers 3" and Smaller: Provide Schedule 40 galvanized pipe sleeves.
 4. Horizontal Construction Supporting Risers 4" and Larger: Provide Thunderline "Link-Seal" Model WS galvanized steel wall sleeves or Schedule 40 galvanized pipe sleeve with four, six (6) inch long, 3/8" diameter reinforcing rods welded radially to the sleeve on 90-degree centers, set in concrete.
 5. Exterior Building Construction: For exterior concrete construction above and below grade, and exterior brick or masonry above grade, provide Thunderline "link-seal" Model WS galvanized wall sleeves or Schedule 40 black steel pipe with 1/4" thick steel plate secured to the piping with continuous fillet weld. The plate shall be located in the middle of the wall and shall be four inches wider all around than the sleeve it encircles. The entire assembly shall be hot dipped galvanized after fabrication. Seal off annular opening between piping and sleeve with "Link Seal" Casing Seal: Thunderline Corporation, Livonia, Michigan; "Pipe Linx": Mason-Dallas, Inc.
 6. The piping sleeve shall be sized to accommodate the casing seal. Casing seals shall be Series 300 for piping sizes 3/4" through 4", Series 400 for piping 5" through 24", and Series 500 for piping 30" and larger.
- F. Installation: At no point shall the pipe or its insulation touch the sleeve it passes through. Clearance around piping shall not be less than 1/2" or more than 1". Seal all sleeves that are not in exterior construction below grade or rated construction with an approved non-hardening mastic. Seal sleeves through fire rated construction as specified herein and as detailed on the Drawings. Sleeves below grade shall be sealed with Thunderline "Link-Seal" model LS or Mason-Dallas "Pipe Linx" mechanical seals.

- G. Option: At the contractor's option, waterproof, fire rated Sleeve/Coupling Penetrations: ProSet Systems, Inc., may be used for non-isolated piping systems in lieu of galvanized sleeves specified hereinabove.

3.5 CUTTING AND PATCHING

- A. Where it becomes necessary to cut through any wall, floor or ceiling to permit the installation of any Work, or to repair any defects that may appear, the cutting shall be performed under the supervision of the General Contractor. Inform the Owner's representative before any work commences. No structural member shall be altered without the written permission of the Structural Engineer.
- B. Patching of all openings cut by this Contractor or repairing of any damage to the work of other trades occasioned by cutting operations, or occasioned by the failure of any part of work installed under this Contract, shall be performed by the trade whose work is involved, but shall be paid for by this Contractor.
- C. Any openings cut through exterior walls or roofs shall be provided with suitable covers while they are left open to protect the property or materials involved. Any openings cut through walls below grade shall be properly protected to prevent entrance of water or other damaging elements.
- D. Water Stops: Provide water stops at new penetrations of existing floors. Water stops shall be at least 16 gauge and be sized as specified herein for sleeves. Water stops shall be securely attached to the top of the floor slab with a waterproof mastic applied between the bottom flange of the water stop and the floor slab. The thickness of the firesafing system shall not exceed the existing floor thickness.

3.6 FLASHING

- A. Flash around all vent pipes passing through the roof with sheet lead not less than 4 lbs. per square foot, built a minimum of 8" into the roofing in all directions from the outside of the pipe, running up the pipe, and turned over into the pipe cavity.

3.7 FIRESTOPPING

- A. Where Division 20-28 materials and system supports pass through fire or smoke rated construction, they shall be fire stopped with a factory-built UL Classified Through-Penetration Firestop Device, or with manufactured Fill, Void, or Cavity Materials Classified by Underwriters Laboratories, Inc. for use in a UL Classified Through-Penetration Firestop System to prevent the spread of smoke, fire, toxic gas, or water.
- B. The Firestop Devices, Materials, and Systems shall meet all the fire test and hose stream test requirements of ASTM E119, "Standard Test Methods for Fire Tests of Building Construction and Materials", or ASTM E814, "Standard Test Method for Fire Tests of Through-Penetration Fire Stops".
- C. "F" ratings of the Firestop used shall be not less than the required fire resistance rating of the wall or floor penetrated. "T" ratings shall be as required by local code for the type of building construction.

- D. Fill, Void, or Cavity Materials shall only be installed in accordance with UL classified system numbers.
- E. All firestop Devices and Systems shall be approved for such use by the authority having jurisdiction.
- F. Excessive shrinkage of the fire stopping materials that would permit the transmission of smoke or water prior to exposure to a fire condition is unacceptable. Where mastic is used to seal the surface of the firestop, the mastic shall be non-hardening. Firestop Systems for isolated piping systems shall be non-hardening except that non-hardening putty will not be acceptable. The Firestop System used shall accommodate expansion and contraction of the floating mechanical piping systems without damaging the firestop or reducing its effectiveness as a barrier to the passage of smoke, fire, toxic gas, or water.
- G. Submittal data for Firestop Materials shall include the U.L. System Numbers listed in the U.L. Fire Resistance Directory under which the material was tested in accordance with ASTM E 814 (UL 1479) or ASTM E119.
- H. If it complies with these Specifications, firestop Devices, Systems, and Materials manufactured by one of the following manufacturers will be acceptable:
 - 1. Tremco Fire-Resistive Joint System using Dymeric sealant and Cerablanket-FS mineral filler
 - 2. 3M Fire Barrier Penetration Sealing Systems (Electro Products Division)
 - 3. GE Pensil 1851 Silicone RTM by General Electric
 - 4. ProSet Systems, Inc.
 - 5. The Rectorseal Corporation
 - 6. STI
 - 7. Hilti

3.8 PAINTING

- A. Field painting will be provided under Division 9 utilizing these guidelines.
- B. All machinery and equipment not finished at the factory shall be given a prime coat and then finish painted with two coats of enamel in colors as directed by the Architect/Engineer or Owner's Representative. No nameplates on equipment shall be painted, and suitable protection shall be afforded such plates to prevent their being rendered illegible during the painting operations.
- C. All un-insulated black steel pipe, hangers and supports shall be given two (2) coats of zinc-epoxy primer. Where exposed to outdoor weather or public view, these items shall be primed and finished with two coats of epoxy in colors as indicated in the Piping System Identification Table. Outdoor insulated piping shall be primed prior to application of insulation.
- D. All un-insulated black steel pipe direct buried shall be given two coats of primer and then coated with 3M Scotchwrap Pipe Insulation #50 applied in strict accordance with manufacturer's published recommendations (machine wrapping of pipe is acceptable) prior to burial in the ground.

- E. All insulated piping exposed to view shall have the finished insulation painted with two coats of acrylic in colors as indicated in the Piping System Identification Table. Piping concealed in furrings, chases, or above suspended ceilings, need not be painted.
- F. All grilles and registers will be furnished with a factory-applied finish. Should the plans indicate that certain grilles and registers be furnished with a factory-applied prime coat for field painting, the cores shall be removed for painting under another Division. The frames, after installation, shall be given two coats of enamel. The cores shall be spray painted with two coats of enamel and shall be reinstalled in the frames only after both cores and frames are thoroughly dry. In such cases the color of the enamel finish shall be as directed by the Architect/Engineer.
- G. Before painting, all surfaces to be painted shall be suitably prepared. This shall include removing all oil, rust, scale, dirt, and other foreign material. Surfaces shall be made smooth by grinding, filing, brushing, or other approved method. In the painting operations, the primer for metal surfaces shall be of the zinc dust type, and where finish painting is specified for a finish, it shall be painted as specified in another Division.
- H. Except where specific materials and colors are designated above, the various piping systems, hangers, supports, equipment items, machinery and appurtenances shall be painted using materials and colors approved by the Architect/Engineer.
- I. PIPING SYSTEM IDENTIFICATION TABLE (Also refer to Section 23 21 13)

PIPE MARKERS CLASSIFICATION LEGEND				
PIPING SYSTEM	COLOR PIPE	COLOR FIELD	COLOR LETTERS	DIRECTIONAL ARROWS
CONDENSER WATER SUPPLY	Light Green	Green	White	Yes
CONDENSER WATER RETURN	Dark Green	Green	White	Yes
CHILLED WATER SUPPLY	Dark Blue	Green	White	Yes
CHILLED WATER RETURN	Light Blue	Green	White	Yes
HOT WATER HEAT SUPPLY	Dark Red	Yellow	Black	Yes
HOT WATER HEAT RETURN	Light Red	Yellow	Black	Yes
DOMESTIC COLD WATER	Brown	Green	White	No
HOT WATER SUPPLY 120°	Tan	Yellow	Black	Yes
HOT WATER RETURN 120°	Tan	Yellow	Black	Yes
250 PSI STEAM SUPPLY	Orange	Yellow	Black	Yes
100 PSI STEAM SUPPLY	Orange	Yellow	Black	Yes
25 PSI STEAM SUPPLY	Orange	Yellow	Black	Yes
PUMPED STEAM CONDENSATE RETURN	Light Orange	Yellow	Black	Yes
GRAVITY STEAM CONDENSATE RETURN	Light Orange	Yellow	Black	Yes
HOT WATER SUPPLY 140°	Tan	Yellow	Black	Yes
HOT WATER RETURN 140°	Tan	Yellow	Black	Yes
WASTE AND VENT	Black	Green	White	Yes
FUEL OIL	Safety Yellow	Yellow	Black	Yes
OXYGEN	Light Green	Green	White	No
NITROGEN	Black	Green	White	No
NITROUS OXIDE	Light Blue	Yellow	Black	No

PIPE MARKERS CLASSIFICATION LEGEND				
PIPING SYSTEM	COLOR PIPE	COLOR FIELD	COLOR LETTERS	DIRECTIONAL ARROWS
MEDICAL AIR	Light Yellow	Blue	White	No
VACUUM	Silver	Yellow	Black	Yes
NATURAL GAS	Safety Yellow	Yellow	Black	No
COMPRESSED AIR		Yellow	Black	
FIRE PROTECTION	Red	Red	White	No

3.9 IDENTIFICATION AND LABELING OF ELECTRICAL EQUIPMENT

- A. Equipment: All service entrance equipment, distribution equipment, and distribution panelboards, including their associated branch circuit devices, and each new major item of electrical equipment including lighting and power panelboards, motor starters, transfer switches, and disconnect switches, shall be properly identified by the attachment of engraved nameplates constructed from laminated plastic, at least 1/16-inch-thick 3-ply, with black surfaces and white core. Emergency power equipment nameplates shall have red surfaces and white core.
- Engraving shall be condensed gothic, at least 1/4 inch high. The engraved nameplates shall be securely attached to the device or panelboard using non-corroding screws. The use of adhesive or tape attachment is not acceptable.
 - Labeling shall include the name of equipment the device feeds, the source panel, the source circuit number, and the voltage. Consult the Mechanical, Electrical and Plumbing drawings for label nomenclature.
 - Transfer Switches: Transfer switch nameplates shall include the name and circuit number for the normal and emergency power sources to the transfer switch.
 - Fire Pump: Fire pump controller, transfer switch, emergency power source, and overcurrent protection device shall be labeled as per NFPA-20.
- B. Miscellaneous Switch Plates or Device Plates: Device and switch plates for all 20-amp devices circuited to "emergency" circuits, special purpose outlets, pilot lights, remote operated light switches, devices in critical care areas of healthcare facilities, and all remote-control devices shall be identified by engraving the switch plate or device plate.
- Nomenclature shall include the panel and circuit of the outlet or switch, or the indication of the pilot, or the area of control, or equipment served. Consult the Architect/Engineer for label nomenclature.
 - Plates shall be stainless steel or as otherwise specified.
 - Engraving shall be 3/16-inch condensed gothic and shall be filled with black enamel.
- C. Conduits: All exposed conduits shall have the voltage marked on 50-foot centers, at least one in each room and at all junction boxes and electrical devices. Markers shall be Brady B-500 vinyl cloth with black letters on an orange background or an approved equal. Emergency power conduits shall also be labeled to indicate the type of service. Designations shall be approved by the Architect/Engineer.

- D. Emergency Power Panelboards: Engraved red nameplates for panelboards serving emergency power loads shall indicate the "Branch" of the Essential Electric System served. The nameplate shall also identify the voltage, circuit number, and equipment name from which the incoming feeder circuit was derived.

3.10 IDENTIFICATION AND LABELING OF EQUIPMENT, PIPING, VALVES, AND ACCESS DOORS

- A. Equipment: Rooftop equipment, air handling units, pumps, water heaters, supply fans, duct heaters, exhaust fans, water chilling units, boilers, cooling towers, terminal units and any other equipment designated by the Architect/Engineer shall be labeled with permanently attached engraved nameplates constructed from laminated phenolic plastic, at least 1/16-inch-thick, 3-ply, black surfaces and white core. Engraving shall be condensed gothic at least 3/8 inch high. Engraving shall include equipment name and number and electrical panel and circuit that serve the equipment. Consult the Drawings for label nomenclature.
- B. Valves: All valves at major equipment and in all equipment, rooms shall be marked with 1-1/2" diameter aluminum or engraved plastic tags securely attached to valve stems with "S" hooks.
- C. Piping: Piping at major equipment and in all equipment, rooms shall be identified by color-coded markers as to type of use, service and direction of flow as indicated within the Piping System Identification Table. Markers shall be located at each valve, at entries through walls, and on 20 ft. centers on straight runs of pipe. Piping concealed in accessible locations shall be marked on 50-foot centers on straight runs of pipe, at all changes in direction, and at least one location above each room having partitions to structure. Labels shall be as manufactured by Brady, Brimar, Seton, Marking Services, Inc., or Westline.
- D. Access Doors: Access doors provided for access and servicing of fire and smoke dampers shall be labeled as to type of damper (fire, smoke, combination fire and smoke) served.
- E. Equipment nameplates and valve designation data shall be recorded on Record Drawings, and on itemized listing by equipment types and valve number sequence. Itemized listings shall include designation, device description and device location.

F. PIPING SYSTEM LEGEND LETTER SIZING TABLE

OUTSIDE DIAMETER OF PIPE OR COVERING - INCH	LENGTH OF COLOR FIELD - INCH	SIZE OF LETTER - INCH
3/4 to 1-1/4	8	1/2
1-1/2 to 2	8	3/4
2-1/2 to 6	12	1-1/4
8 to 10	24	2-1/2
OVER 10	32	3-1/2

3.11 WARNING SIGNS

- A. Provide warning signs where there is a hazardous exposure associated with access to or operation of mechanical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location. Mount warning signs permanently in an appropriate and effective location in the space, at equipment, and on piping and ductwork.
- B. Comply with recognized industry standards for color and design.

3.12 EXPOSED PIPING

- A. All exposed piping in finished areas shall be polished chrome plated unless noted otherwise on the Drawings. This shall include piping, fittings and valves. Polished chrome plated sleeves may be used over piping provided that the finished installation presents the appearance of a fully chrome plated system.

3.13 EQUIPMENT PADS AND ACCESSORIES

- A. Equipment Housekeeping Pads and Anchor Bolts: Concrete pads for equipment will be furnished under another Division. Pads shall be provided in equipment rooms, and in other locations with major equipment installed. Pads shall nominally be 3-1/2" high and shall generally conform to the shape of the piece of equipment it supports with a minimum of 3" margin around the equipment and supports. Height of pads for air handling units shall consider whether the units have internal or external vibration isolation to permit proper installation of the condensate drain p-trap.
- B. Pad Materials: Pads shall be minimum 2500 psi (28 day) concrete reinforced with 6 x 6 #6 welded wire mesh. Tops and sides of pads shall be hard troweled smooth with a 3/4" bullnose on all external corners. Furnish galvanized anchor bolts according to the equipment layout templates for installation in equipment pads. Bolts shall be of the size and quantity recommended by the manufacturer and where vibration isolators are used, they shall be anchor bolted to the equipment pad.
- C. Equipment Guards: Provide easily removable expanded metal guards for all belts, couplings, exposed fan inlets and outlets and other moving parts of machinery. Provide tachometer openings in motor and fan shaft guards at least 2" diameter on all belt drive and variable speed equipment.
- D. Belt Drives: Select belt drives as accurately as possible, based upon the design conditions. Whenever, in the course of balancing a system, it is determined that a drive change is required, the Contractor shall furnish one complete drive change without additional cost to the Owner or Architect/Engineer. Multiple belt drives shall have matched belt sets.
- E. Supports: The Contractor shall support all work and equipment furnished under his Division. The Contractor shall study thoroughly all Architectural, Structural, Mechanical, Plumbing, Fire Suppression, and Electrical drawings, shop drawings and catalog data to determine how equipment is to be supported, mounted or suspended, and shall provide all bolts, inserts, pipe stands, brackets and accessories for proper support.

3.14 ACCESS DOORS

- A. Access doors shall be provided by Division 20-28 Contractors for access to valves, balancing dampers, fire dampers, motors, duct cleanouts or any other item which may require servicing or adjusting, and which is concealed behind an inaccessible surface such as spline ceilings and plaster walls or ceilings. Doors shall be factory finished as noted below and turned over to the General Contractor for installation and painting. Doors shall be as manufactured by Inryco/Milcor or an approved equal in the following styles:
1. Drywall construction (vertical partition surface) - Milcor Style DW with gray prime finish.
 2. Drywall construction (ceiling horizontal surface) - Milcor Style ATR with door design for drywall insert.
 3. Finished acoustical ceiling tile - Milcor Style AT with door design for tile insert.
 4. Finished plaster ceiling or walls - Milcor Style AP with door designed for finish plastering.
 5. Masonry or tile walls - Milcor Style M with gray prime finish.
 6. Fire rated walls - Milcor Fire Rated Access Door with gray prime finish.
 7. Fire rated ceiling or ceiling assembly - Milcor Style ATR with door designed for tile insert.
- B. Access doors shall be furnished with a continuous piano hinge with screwdriver operated flush locks and shall be a minimum of 12" x 12". Larger sizes shall be furnished where required for proper access. Access doors shall not be installed until location and style have been approved by the Architect.

3.15 TRENCHING AND BACKFILLING

- A. All underground pipes and conduit shall be laid open in trench. All field measurements, layouts, grade establishments, etc., shall be done by Registered Public Surveyor in the employ of the Contractor. The Contractor's Surveyor shall be on-the-job during all underground Work. The Architect will provide a "Bench Mark" reference for use by the Contractor.
- B. Pipes shall be laid and maintained at required lines and grades during the course of the Work. All joints shall be aligned and complete.
- C. The trench shall be excavated to alignment and depth as required. Trench shall be properly braced and dewatered. The trenches shall be kept free of water at all times during installation, testing of pipe and/or conduit, and back filling. The Contractor shall provide proper facilities for discharging water into natural drainage channels. No water shall be discharged onto a street without approval by the Architect.
- D. All exterior underground piping and conduit shall be installed with a minimum of 18" of earth or equivalent cover, except where specifically shown otherwise or required by the Architect/Engineer.
- E. The trench shall be at least 18" wider than the diameter of the largest bell on the pipe duct bank, and conduit. If the pipe has no bells, the trench shall be at least 18" wider than the maximum diameter of the pipe. Pipe or conduit shall be laid in the center of the

trench. The trench shall be excavated to a depth sufficient to provide for pipe/conduit cushions as specified herein.

- F. Sheet pile and brace excavations wherever necessary to prevent cave-in. Trench width may be increased as required and piling left in place until sufficient compacted backfill is in place. The Contractor shall properly sheet and brace all open trenches to render them secure and shall remove all such sheeting and bracing before completing the backfill. The quantity of the excavation required to install sheeting and the installation and removal of sheetings and bracings will not be regarded as extra Work and all costs incurred for this excavation and the installation of sheeting shall be included in the Contract price.
- G. Trenching may be done with trench digging machinery unless hand digging is required to avoid damage to existing structures or apparatus both above or below grade.
- H. Pipe Cushion/Select Fill: Upon completion of excavation and prior to the laying of the pipe or conduit, the trench bottom shall be brought up to the required elevation with a pipe cushion, except where the cushion has been eliminated by the Architect. Pipe and conduit cushions shall be selected material deposited in the trench, and shall be compacted, leveled off, and shaped to obtain a smooth compacted bed along the laying length of the pipe. Material for pipe and conduit cushion shall comply with local codes and shall be placed in accordance with the Earthwork section of the specifications. In absence of local code requirements, the cushion shall be select fill with a PI of between 10 and 20. Any select fill used shall pass a one-inch screen.
- I. Pipes and conduit shall not be laid in water or when trench condition is unsuitable.
- J. As sections of pipe and conduit are installed, they shall be temporarily sealed until remaining sections of the piping have been installed to complete the system.
- K. Cast iron pipes subject to potential heads of 15 feet of water or more shall have concrete anchors at each change in direction and/or as directed. Any change in direction exceeding 15 degrees shall be anchored. Concrete anchors shall rest against solid (virgin) ground with the required area of bearing on pipe and ground to provide suitable anchoring.
- L. Trenches shall be backfilled only after piping has been inspected, tested, and approved by the Architect/Engineer. All backfill material shall be placed in the trench either by hand or by approved mechanical methods. The compaction of backfill material shall be accompanied by tamping with hand tools or approved pneumatic tampers, by using vibratory compactors, or by any combination of these. The method of compaction shall be approved, and all compaction shall be done in accordance with requirements of the Earthwork section of the Specifications. Backfill completely around pipe or conduit, including 18" above the pipe or conduit, with select fill, tamped in 8" layers under, around, and over pipe or conduit. The remainder of the backfill for all pipes or conduit shall be select backfill material tamped at intervals of no more than 12" depths, to attain Proctor Compaction Density required. If in the opinion of the Architect or the Geotechnical Consultant, the excavated material does not meet the requirements for select fill, the Contractor shall be required to screen the material prior to its use as select fill material. Material used in the upper portion of the backfill or sub-grade shall not contain stone, rock, or other material larger than six inches in its longest dimension. No

wood, vegetable matter, or other material, which in the opinion of the Architect or Geotechnical Consultant, are unsuitable shall be included in the backfill. Backfill shall be brought up to finish grade identified on the Architectural Drawings and include additional backfill required to offset settlement during consolidation.

- M. At building perimeter where pipe or conduit exits the building, mix a granular pellet form of Bentonite with select fill and completely fill trench for 8 feet inside and outside building exterior to create a vertical hydraulic barrier.
- N. When removal of unsuitable excavated material creates a shortage of backfill material, the Contractor shall, at no cost to the Owner, furnish material as specified in this Section in the amount required to complete the backfill.
- O. Existing street, driveways, and sidewalks damaged during the excavation work shall be restored to acceptable condition, subject to approval by the Architect.
- P. Provide all street and sidewalk excavations with approved barricades, warning lights, and cover plates as required by the Authorities Having Jurisdiction.
- Q. Submit complete installation and test procedures of the excavation and backfill work for approval by Architect prior to commencing any work.

3.16 CURBS AND SUPPORTS - ROOF MOUNTED EQUIPMENT

- A. Where required, curbs and supports shall be of box section design, heavy gauge galvanized steel or aluminum construction, continuous mitered and welded corner seams, integral base plate, factory installed wood nailer, and shall be insulated with 1-1/2" thick, rigid fiberglass board insulation. Curbs and supports shall be mounted and flashed according to manufacturer's recommendations. Curbs for sloping roof surfaces shall be custom fabricated such that supported equipment is level. Curbs and Support: Pate Company of the style as outlined below or approved equal.
 - 1. Utility Fan Curbs: Shall be style PC-1A, 12" high.
 - 2. Duct Curbs: Where ducts are required to penetrate the roof without passing through an equipment curb, Pate style PC-1A, 12" high curbs shall be used.
 - 3. Piping Curbs: Where piping penetrates the roof without passing through an equipment curb, Pate style PCA-1, 12" high curbs shall be used.
 - 4. Equipment Supports: Roof mounted equipment shall be supported using Pate style ES-1A equipment supports with provisions for securing equipment as required. Equipment curbs shall be at least 12" high. Curbs for sloping roof surfaces shall be custom fabricated such that supported equipment is level.
 - 5. Pipe and Ductwork Supports: Piping and ductwork routed on roofs shall be suspended using support products as manufactured by Portable Pipe Hangers, Inc. of Stafford, Texas. Supports shall consist of reinforced pre-cast concrete bases, tubular steel frame, and hangers as specified in HANGERS AND SUPPORTS. The tubular steel frame and rollers shall be hot dipped galvanized to prevent rust. Threaded rods, nuts, washers, etc., shall be cadmium plated. Pipe hangers shall be adjustable in height to provided appropriate pipe slope where required and equally distribute the piping load. Pipes and ducts shall be suspended a minimum of 18" above the roof surface. The entire support system shall be designed by a factory-authorized engineer and shall consist of standard

and custom hanger arrangements as required for proper support. The support system shall accommodate piping expansion/contraction and for pumped water systems shall accommodate system vibrations. See Section 20 05 48, Noise and Vibration Isolation. The design shall be coordinated with the pipe and duct fabrication drawings, building structure, and actual roof construction. Provide protection pads such as Siplast Trafbloc composed of chopped rubber particles and synthetic binders under each pre-cast concrete base. Use polyurethane caulking where the frame fits into the base to prevent water migration into the insert. Install the piping support system in accordance with the manufacturers written installation instructions.

- B. Roof mounted equipment shall be designed and constructed to sustain vertical and horizontal loads due to wind as prescribed by the building code. In the absence of specific building code requirements, the design wind load shall be based on an ultimate wind speed of based on an ultimate design wind speed of 139 mph, roughness Class C, as per IBC Section 1609. Manufacturer shall submit a curb or support design that is sealed by an Engineer licensed in the state where the project is to be located. Documentation shall be provided indicating that the equipment casing and components are designed to sustain the prescribed wind loading.

3.17 SUBMITTALS

- A. Submit shop drawing information on the following Basic Materials:
1. Link Seal mechanical seals and sleeves.
 2. Pipe Cleaning and Sterilizing methods and materials.
 3. Pipe Hangers, Supports, Saddles, Insulation Shields and Anchors for attaching hangers and supports to the building structure.
 4. Fire Stop Materials with manufacturers recommended installation details.
 5. Miscellaneous Curbs and Supports.
 6. Equipment (housekeeping) Pad drawings.
 7. Identification, Labeling and Warning Signs.
 8. Access Doors.
 9. Pipe Fabrication Drawings.
 10. Roof Mounted Equipment Curbs and Supports.
 11. Cabinets and Pull Boxes.
 12. Additional requirements as outlined in Section 20 05 03.

END OF SECTION

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SECTION 20 05 06

OWNER AND CONTRACTOR FURNISHED EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Schedule of Submittal Data - Section 20 05 04

1.2 SCOPE

- A. Furnish and install Fire Suppression, Plumbing, Heating, Ventilating and Air Conditioning, and Electrical connections and utility provisions for equipment including, but not limited to Owner and Contractor furnished equipment.
- B. Furnish and install all Fire Suppression, Plumbing, Heating, Ventilating and Air Conditioning, and Electrical services for Owner and Contractor furnished equipment as shown on the Drawings, as actually supplied, and as required to suit the actual equipment furnished.
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Plumbing Piping and Accessories - Section 22 11 16
 - 2. Ductwork and Sheet Metal - Section 23 31 13
 - 3. Conduit - Section 26 05 33
 - 4. Conductors - Section 26 05 19
 - 5. Grounding - Section 26 05 26

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Others will set equipment in place, including leveling, fastening, etc., and will furnish to this Contractor, for installation, all trim such as fittings, sink plugs, traps, tailpiece, gas cocks, faucets, etc. This Contractor shall furnish and install all piping, ductwork, conduit, and conductors above floor, between components, furnish and install rough-in and make final connections. All trim will be job site delivered to the Contractor. Trim that is not furnished to the Contractor shall be furnished by the respective Contractor. Equipment will be delivered with all openings and holes drilled in the equipment to accommodate

required fittings. Provide chrome plated brass stop valves on all water connections to equipment.

- B. Where Owner and Contractor furnished equipment consists of multiple components, provide and install all required interconnecting piping, ductwork, conduit, wiring, control wiring, etc.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Rough-in and final connections are the responsibility of the Contractor and he shall closely check service conflicts, access and space constraints. It shall be the responsibility of the Contractor to obtain exact services required for equipment listed. Prior to rough-in installations, the Contractor shall obtain certified rough-in drawings of equipment and coordinate with all trades all connections required for the actual equipment to be installed.
- B. Any changes in location for service rough-ins shall be made at no cost to Owner or Architect/Engineer. Where changes are to be made that are equal to or less than those shown on the plan sheets, then these changes shall be made at no cost as a matter of project coordination. Where these changes exceed service and spatial constraints provided for on the Drawings, notify the Architect/Engineer in writing.
- C. Furnish and install final utility connections to all equipment. Connections shall be coordinated with actual connection sizes and location. All valves, unions, flexible connections, air gaps, traps and other devices required by the plan sheets, equipment shop drawings, cut sheets and equipment manufacturer's written installation drawings, shall be provided and installed.
- D. Utility connections shall be coordinated with equipment so as not to hinder any required service access points and to provide all required service access clearances. Connections shall be concealed to the maximum extent possible and all exposed piping that is not specified to be insulated shall be chrome plated with chrome escutcheons.
- E. It shall be the responsibility of the Divisions 20-28 to coordinate with the Owner, General Contractor and other Divisions to determine which equipment connections and provisions are provided by these Divisions, and which are provided by others and to ensure that provisions are provided in a complete and timely manner.

3.2 PIPE HEAT TRACING

- A. Connect pipe heat tracing cable as specified in Divisions 21, 22, and 23.
- B. The heat tracing cable and all required accessories shall be furnished and installed by Divisions 21, 22, and 23, and grounded, connected and tested by Division 26 per the cable manufacturer's written installation instructions.
- C. Provide ground fault interrupting circuit breakers (GFCI) for all heat trace cable branch circuits.

END OF SECTION

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SECTION 20 05 08

DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05

1.2 SCOPE

- A. Existing buildings and their facilities must remain functional while the Work under this Contract is performed. All system shutdowns and outages must be minimized and coordinated with the Owner.

1.3 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

- A. General: During the construction and remodeling, portions of the project shall remain in service. Construction equipment, materials, tools, extension cords, and similar items shall be arranged so as to present minimum hazard or interruption to the occupants of the building. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch, or replace, as required, any damage that might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction. Cooperate with the Owner and other trades in scheduling and performance of the work.
- B. Loss or Damage: The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen and shall be responsible for repairing or replacing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all mechanical services for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.
- C. Operational Continuity: The Contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.
- D. Utility Access: Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, air conditioning

ductwork, conduit, and equipment, and similar items to provide this access and shall reinstall same upon completion of work in the areas affected.

- E. Demolition of Architectural/Structural Elements: Where partitions, walls, floors, or ceiling of existing construction are indicated to be removed and reinstalled, this Contractor shall remove and reinstall, in locations approved by the Architect, all devices required for the operation of the various systems installed in the existing construction.
- F. Scheduled Service Outages: Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner two (2) weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.
- G. Pre-Demolition Salvage Survey: The Contractor shall modify, remove, and/or relocate all materials and items so indicated or as required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Survey the project with the Owner's Representative before demolition begins and determine all materials that the Owner specifically chooses to be salvaged. Pre-establish with the Owner locations where salvaged materials are to be stored. Salvage materials shall remain the property of the Owner and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and that are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.
- H. Relocated Equipment: All items that are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.
- I. Damaged Materials/Equipment to be Reused: When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.
- J. Termination of Utility Services: Service lines and piping to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities that must remain in

operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinabove specified.

- K. Nighttime Shifts: Certain work during the demolition and alteration phase of construction may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate times with the Owner.
- L. Include in the contract price all rerouting of existing ductwork, piping, air devices, fixtures, and similar items and the reconnecting of existing fixtures and devices as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the Drawings. Furnish all temporary ductwork and piping, and similar items as required to maintain service for the existing areas with a minimum of interruption.
- M. All existing air devices materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place and shall remain in service.
- N. All existing electrical devices, materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place and shall remain in service.
- O. Mechanical equipment and building systems equipment, and similar items that are to remain but are served by piping that is disturbed by the remodeling work, shall be reconnected in such a manner as to leave it in proper operating condition.
- P. Electrical equipment and building systems equipment, and similar items that are to remain but are served by conduit and circuits disturbed by the remodeling work, shall be reconnected in such a manner as to leave it in proper operating condition.
- Q. Existing plumbing fixtures, registers, grilles, and diffusers shown to be removed and indicated to be reused, shall be cleaned, repaired and provided with such new accessories as may be needed for the proper installation in their new locations.
- R. Existing lighting fixtures, outlets, switches, and panelboards shown to be removed and indicated to be reused, shall be cleaned, repaired and provided with such new accessories as may be needed for the proper installation in their new locations.
- S. Within the remodeled or alteration areas where existing ceilings are being removed and new ceilings are installed, all existing air devices, other ceiling mounted devices and their appurtenances shall be removed and reinstalled into the new ceiling, unless otherwise shown or specified.
- T. Within the remodeled or alteration areas where existing ceilings are being removed and new ceilings are installed, all existing light fixtures, fire alarm devices, and other ceiling mounted devices and their appurtenances shall be removed and reinstalled into the new ceiling, unless otherwise shown or specified.
- U. Within the remodeled or alteration areas where existing walls are being removed, all existing fixtures, thermostats, other materials and equipment and their appurtenances shall be removed and relocated if necessary, where required by the remodel work either shown or specified.

- V. Within the remodeled or alteration areas where existing walls are being removed, all existing outlets, switches, other materials and equipment and their appurtenances shall be removed and relocated if necessary, where required by the remodel work either shown or specified.
- W. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.
- X. Equipment, materials or other potential hazards to the public and working occupants of the building shall not be left overnight outside of the designated working or construction areas.
- Y. All existing air handling equipment that is shown as being reused shall have coils cleaned and shall be equipped with new filters and belts by this Contractor.
- Z. No portion of the fire protection or alarm systems shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner's representative.
- AA. Refer to Architectural "Demolition" and "Alteration" plans for actual location of walls, ceiling, and similar items being removed and/or remodeled.
- BB. Drawings do not fully indicate conditions or existing obstructions or utilities. Visit the site and examine work to be removed and become familiar with conditions affecting work.
- CC. Asbestos removal is not part of this Contract.
- DD. Floor Sleeves: Sleeves are not required where new openings are core-drilled into existing construction, unless noted otherwise on the Drawings. Provide water stops at new penetrations of existing floors.
- EE. Wall Sleeves: In the remodel of existing areas, the Contractor shall install new sleeves and seal existing piping penetrations through new walls with materials specified herein.
- FF. Water Stops: Provide water stops at new penetrations of existing floors. Water stops shall be 1-1/2" tall, at least 16 gauge, and be sized as specified in Section 20 05 05 for sleeves. Water stops shall be securely attached to the top of the floor slab with waterproof mastic applied between the bottom flange of the water stop and the floor slab. Pipe supports for riser piping shall be elevated sufficiently on spacers to prevent crushing water stops. The thickness of the firesafing system shall not exceed the existing floor thickness.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 20 05 13

MOTORS AND CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods Section 20 05 05

1.2 SCOPE

- A. Furnish and install all motors required for equipment furnished under Divisions 20-28. All motors shall be factory installed on equipment wherever possible. Motor controllers will, in general, be furnished and installed under Division 26 except for motor controllers which are integrally mounted on equipment or which are specifically required under other Divisions.
- B. All motorized or electrically operated equipment shall be set in place by the furnishing Contractor with all integrally mounted starters, controls and disconnect switches installed. The Contractor shall furnish for installation and connection by Division 26, all starters, controllers and disconnect switches that are furnished with his equipment but not integrally mounted.
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. All sections containing motorized equipment.

1.3 DIVISION 26 PROVISIONS

- A. Division 26 shall furnish, install and connect all overcurrent protection devices, starters and disconnect switches that are not provided with the served equipment.
- B. Division 26 shall furnish and install all interconnecting wiring, conduit and make all connections ready for operation between overcurrent protection devices, motors, starters and control devices, as required by wiring diagrams (on approved shop drawings) provided by the Division furnishing the Equipment.
- C. Division 26 shall furnish miscellaneous 120-volt control power circuits required for systems and equipment furnished by other Divisions. These control power circuits shall be furnished by Division 26 for all systems and equipment and where shown on the

Drawings or on approved shop drawings by the Division furnishing the system or equipment.

1.4 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

1. Motors:

- a. Baldor - Reliance
- b. General Electric
- c. Century
- d. Teco - Westinghouse
- e. WEG

2. Controllers:

- a. ABB
- b. Danfoss

- B. Standards: Motors shall be compliant with IEEE 841.

PART 2 - PRODUCTS

2.1 GENERAL PURPOSE MOTORS

- A. All motors 1/2 horsepower and smaller shall be 120-volt, 1 phase, 60 hertz unless noted otherwise. All motors 3/4 horsepower and larger shall be 460 volts, 3 phase, 60 hertz unless noted otherwise.
- B. General: All motors shall be started across-the-line unless specified otherwise. Motors for indoor protected use shall be open drip-proof (ODP) construction. All motors exposed to weather shall be totally enclosed fan-cooled (TEFC) or totally enclosed air-over (TEAO) construction. All motors shall be single speed 1750 RPM, unless specified otherwise. Two-speed motors shall be either two-speed, one-winding (2S-1W) or two-speed, two-winding (2S-2W), as specified. All motors used with wye-delta reduced voltage starting shall be wound with taps for wye-delta reduced voltage starting. All motors shall be suitable for use with variable speed drives. Motors used with variable speed drives shall be equipped with shaft grounding bushings. Refer to other Sections herein, equipment schedules, and Electrical Drawings for applications of two-speed motors, motors with reduced voltage starting, and motors used with variable speed drives.
- C. Service Factor: All open motors shall be 1.15 service factor and all enclosed motors shall be 1.0 service factor. All motors shall be rated for continuous duty. All motors shall be selected at design conditions without exceeding nameplate ratings if a 1.0 service factor is assumed.

- D. Bearings: Motors shall have either sealed ball bearings or field lubricated type ball-bearings. Field lubricated ball bearings shall be drilled for grease fittings and have Zerk fittings installed. Where motors are installed inside equipment, extended grease lines with Zerk fittings shall be provided.
- E. Balancing: Motors shall be statically and dynamically balanced and tested at the factory prior to shipment and shall be selected for quiet operation.
- F. Windings: All motors shall have copper windings.
- G. Insulation: Open single-phase motors shall have Class A or B insulation, open three-phase motors shall have Class B insulation, and all enclosed motors shall have Class F insulation.
- H. Single Phase Motors: All single-phase motors shall be capacitor start, permanent split capacitor, or electrically commutated type selected to suit the load served. Single phase motors 1/2 horsepower and smaller shall have internal thermal protection.
- I. End Bells: All open motors 10 horsepower and smaller shall have cast iron end bells with steel frames. All open motors 15 horsepower and larger and all enclosed motors shall have cast iron housings.
- J. Nameplate: A motor nameplate shall be attached to each motor and shall indicate motor electrical data, horsepower, RPM, frequency, service factor, insulation class, NEC Code number, efficiency, and winding material.
- K. Energy Efficient Motors: Unless more stringent requirements are noted elsewhere in the specifications or drawings, motors shall comply with the following requirements:
 - 1. Three-phase motors one horsepower and larger shall comply with the DOE Integral Horsepower Motor Rule, effective June 1, 2016, and shall be Premium efficiency in accordance with NEMA MG 1 Table 12-12.
 - 2. Fractional horsepower motors shall comply with the DOE small motor rule, effective March 9, 2015.
 - 3. Motor efficiency shall be based upon dynamometer testing, per IEEE Standard 112 Method A or IEEE Standard 112 Method B as applicable and as set forth by NEMA MG 1-12.53a standard for efficiency testing. Motor shall be labeled in accordance with NEMA MG 1-12.53b. Energy efficient motors shall be Baldor Super-E motors or approved equal.

2.2 INDIVIDUAL MOTOR CONTROLLERS

- A. General: Furnish and install motor controllers as specified herein and in other Specification Sections, and as shown on the Drawings.
- B. The extent of motor controllers work is as shown and scheduled, as indicated by the requirements of this Section, and as specified elsewhere in these Specifications.
- C. Starter: Individual one-speed motor controllers shall consist of an integrally mounted, magnetic, full-voltage non-reversing (FVNR) starter. Individual two-speed motor controllers shall consist of an integrally mounted, magnetic two-speed, two-winding (2S-

2W) or two-speed, one-winding (2S-1W) starter. Starter enclosures shall be heavy-duty type, dead front, and surface mounted sheet steel enclosure with lockout-tagout feature. Size and number of poles shall be as shown and as required for the equipment served. All controllers shall be constructed and tested in accordance with the latest NEMA standards.

- D. Contacts: Magnetic motor controller contacts shall be solid silver cadmium oxide alloy, and shall not require any filing, dressing, or cleaning throughout the life of the starter.
- E. Coils: Operating coils shall be 120 volts and shall be pressure molded and designed so that accidental exposure to excessive voltage up to 480 volts will not damage the coil. The starter design shall also be such that when a coil fails due to an over-voltage condition, the starter shall definitely open, and shall not freeze in the closed position.
- F. Overload Relays: Motor controllers shall have manual-reset, trip-free overload relays in each phase conductor. Three phase FVNR starters shall have three overload relays. Single-phase motor controllers shall have overload protection for ungrounded conductors. Two-speed, full-voltage magnetic starters shall have overload relays in all six (6) control legs. Overload relays shall not be field convertible from manual to automatic reset. Overload relays that change to automatic reset from manual reset when the reset mechanism is blocked are not acceptable.
- G. Pilot Lights: Provide green RUNNING pilot lights for all motor controllers. Furnish additional pilot lights for motor starters where shown. Pilot lights shall be operated from an interlock on the motor controller and shall not be placed across the operating coil. The pilot lights shall be mounted in the controller enclosure cover.
- H. Switches: Motor controllers shall be provided with 3-position HAND/OFF/AUTO selector switches, speed selector switches, or START-STOP pushbuttons as required, with appropriate labels.
- I. Control Power Transformer: A single-phase control power transformer shall be included integral with each starter for 120-volt control power. The primary shall be fused and connected to the line side of the starter. The secondary shall have one leg fused and the other leg grounded. Arrange the transformer terminals so that wiring to terminals will not be located above the transformer. The control power transformer shall have sufficient capacity for all lights, coils, actuators, dampers, etc., that are connected to it.
- J. Auxiliary Contacts: Each starter shall have one normally open and one normally closed convertible auxiliary contacts in addition to the number of contacts required for the "holding interlock" and control wiring. In addition, it shall be possible to field-install one or more additional auxiliary contacts without removing existing wiring or removing the starter from its enclosure.
- K. Power Monitor: The starter for 3-phase motors of 5 HP or greater shall be provided with a 3-phase power monitor relay which shall drop out upon loss of any phase, undervoltage on any and all phases, or phase reversal from A-B-C sequence. The relay shall be adjustable for the trip range and shall automatically reset upon correction of trouble. The 3-phase power monitor shall be Time Mark Corporation Model #A258B (480V) and Model #258B (208V) or approved equal. Where starters are provided as an

integral part of the control panel, the power monitors shall be provided with the furnished control panel.

- L. Pre-Wiring: The starter unit shall be completely pre-wired to terminals to eliminate any interior field wiring except for connection of power supply conductors to switch line side terminals, motor leads to the starter load side terminals, and control conductors to holding coil terminals. All internal conductors shall be copper.
- M. Enclosure: All motor starter enclosures shall be NEMA 1, general-purpose type, unless exposed to the weather or otherwise indicated. Enclosures exposed to the weather shall be NEMA 3R.
- N. Wiring Diagram: Every starter shall have an internal wiring diagram attached to the inside of the starter cover and shall be labeled inside the cover to indicate the type and ampacity of thermal overloads installed.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Submittals for motorized equipment shall include, but not be limited to, the following information:
 - 1. Manufacturer's Name and cutsheets
 - 2. Motor Type
 - 3. Horsepower
 - 4. Voltage/Phase/Hertz
 - 5. Integral Overload Protection (PTC, thermal switch, thermal protector)
 - 6. RPM
 - 7. Service Factor
 - 8. Insulation Class
 - 9. NEC Code Number
 - 10. Motor Efficiency and Testing Method
 - 11. Materials of Construction Data
 - 12. Additional information as required by Section 20 05 03

3.2 INSTALLATION

- A. Motors shall be factory mounted and aligned on equipment wherever possible. After equipment installation, alignment of factory-installed motors shall be checked, and the mounting bolts shall be checked to ensure that they are tightly fastened. Field-installed motors shall be installed level and adjusted for true angular and concentric alignment. Following alignment, mounting bolts shall be securely fastened.

END OF SECTION

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SECTION 20 05 14

ELECTRONIC VARIABLE SPEED DRIVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods - Section 20 05 05

1.2 SCOPE

- A. Provide and install electronic variable speed drives (VSD) as shown, scheduled, and specified.
- B. Types: Variable frequency motor speed controllers.
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. HVAC Pumps - Section 23 21 23
 - 2. Fans - Section 23 34 10
 - 3. Water Chilling Units - Centrifugal - Section 23 64 16
 - 4. Cooling Towers - Section 23 65 19
 - 5. Air Handling Units - Section 23 73 00

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. ABB
 - 2. Approved Equal (substitution request must be made and approved prior to bid)
- B. Codes and Standards:
 - 1. Products shall be designed, manufactured, tested and installed in compliance with the following standards, as applicable:
 - a. UL or ETL listed.

2. At a minimum, the drives shall have internal impedance equivalent to 5% to reduce the harmonics to the power line. 5% impedance may be from dual (positive and negative DC link) chokes, or AC line reactor. Drives with only one DC link choke shall add an AC line reactor. The entire system shall comply with IEEE 519-2014 & IEEE 519-1992 for distortion within the building and at the point of common coupling. Provide a harmonic analysis to prove compliance.
 3. For initial pricing purposes prior to final bid, assume all drives greater than or equal to 50HP shall be ultra low harmonic type equal to ABB ACH580-ULH series.
 4. VSD design and construction shall comply with all applicable provisions of the National Electric Code.
- C. Factory Testing: To ensure quality, the VSD shall be subject to the following factory tests:
1. Unit shall be factory tested while fully loaded.
 2. The drive manufacturer shall certify in writing that the selected driven machine, motor and drive assembly operate together as a system without excessive electrical distortion, motor overheating, physical noise or vibration.
- D. Warranty: Include full parts and labor warranty for turnkey resolution with no cost to the Owner for repair or replacement for a period of two (2) years, starting on the date of Certificate of Substantial Completion.

PART 2 - PRODUCTS

2.1 ELECTRONIC VARIABLE SPEED DRIVES

- A. General: Provide electronic IGBT based pulse-width modulated variable speed drives for control of standard or high-efficiency NEMA Design B induction motors on air handling units, fans, and pumps where specified herein, scheduled or shown on the Drawings.
- B. Operation: Each variable speed drive shall convert available utility power to adjustable voltage/frequency, 3-phase, AC power for stepless motor control from 25 to 110% of motor 60 Hz speed.
1. The variable speed drive (VSD) shall produce an adjustable AC voltage/frequency output for complete motor speed control. Speed control shall be stepless throughout the range under a variable torque load on a continuous basis. The VSD shall be automatically controlled by an external control signal.
 2. The VSD maximum output current rating shall be greater than or equal to the motor nameplate full load. The input power factor of the controller shall be 0.95 or greater under all speed and load conditions and the unit shall be rated for 100% operation at full rated current, voltage and frequency.
 3. A dedicated line filter shall be provided at the input of the VSD to limit EMI and voltage distortion from interference with vital electrical equipment. Voltage line notching is not acceptable. DC Bus chokes may be provided in lieu of line filters if they perform their intended function.
 4. All drives on the project shall utilize the same keypad user interface.

- C. Components: Each controller shall include, but not be limited to, an input rectifier, constant voltage DC link, filter, sine-weighted pulse width modulation inverter and accessory sections with each section modularized for ease of troubleshooting. Controller shall be protected with I²T fuses or circuit breakers per the manufacturer's design and specification. All components shall be factory mounted and wired on a dead-front, grounded, free-standing or wall-mounted minimum NEMA 1 enclosure arranged for top or bottom conduit entry. The free-standing enclosure shall be suitable for mounting on a steel platform or on a concrete housekeeping pad.
1. The controller enclosure shall be provided with the manufacturer's illustrated operating instructions and parts list mounted inside the enclosure door, manual speed control potentiometer, three position mode selector switch (manual-off-auto), "power on" light, diagnostic/frequency display, auxiliary relays, and contacts for interlock and control wiring.
 2. Controllers located outdoors for cooling tower applications shall have NEMA 4 enclosures.
- D. Features: VSD features shall include, but not be limited to, the following:
1. Input Power: 460 volts AC $\pm 10\%$, 60 Hz, ± 1.8 Hz. Input power factor shall be 0.95 or greater from full motor speed to zero speed for any motor load.
 2. SEMI-F47 certified: The drive must tolerate voltage sags to 50% for up to 0.2 seconds, sags to 70% for up to 0.5 seconds, and sags to 80% for up to one second.
 3. Output Power: Three phase, 0-460 volts, 2-60 Hz.
 4. Ambient Temperatures:
 - a. Operating: 0°C to 40°C (32°F to 104°F).
 - b. Storage: -20°C to 60°C (-4°F to 140°F).
 5. Frequency Stability: Output frequency will be held to $\pm 0.1\%$ of maximum frequency regardless of load, $\pm 10\%$ input voltage change or temperature changes within the ambient specification.
 6. Disconnect: Locking input disconnect switch or circuit breaker with external operating handle suitable for 100,000 amp SCCR drive rating.
 7. Bypass: Provide manual bypass which isolates the drive from the circuit and allows motor operation at full across-the-line speed. Bypass shall include motor contactor, drive isolation contactors, motor overload protection, fused control power transformer and front panel mounted bypass controls.
 8. Current Limit: To limit output current to 110% of that of the drive rating. The current limit shall be designed to function automatically to prevent overcurrent trip due to momentary overload conditions, allowing the drive to continue operation.
 9. Instantaneous Overcurrent Trip: To safely limit the output current in under 50 microseconds due to short circuit or severe overload conditions.
 10. Undervoltage Trip: To protect the drive due to non-momentary power of phase loss. The undervoltage trip will activate automatically when line voltage drops 15% below rated input voltage.
 11. Overvoltage Trip: To protect the drive due to voltage levels in excess of its rating.

12. Ground Fault Protection: Fuseless electronic power protection for ground fault protection. Isolation transformers for ground fault protection are not acceptable. Ground fault shall not cause fuses to open.
13. Overload Protection: Electronic output overload protection shall be provided to eliminate the use of bimetallic overloads. The drive shall not be phase sequence sensitive. The overload protection shall also protect the motor when it is operated at full speed in the bypass mode.
14. Over-Temperature Trip: To protect the drive from elevated temperatures in excess of its rating. An indicating light shall be provided to alert the operator to an over-temperature condition. When the over-temperature trip point is reached, this light will be continuously illuminated.
15. Automatic Reset/Restart: The drive shall be equipped such that a trip condition resulting from overcurrent, undervoltage, overvoltage or over-temperature shall be automatically reset, and the drive shall automatically restart upon removal, or correction of the causative condition. The number of reset/restart attempts for undervoltage, overvoltage, over temperature and overcurrent shall be limited to five. If, in five attempts, a reset/restart is not successful, the drive shall shut down safely, requiring a manual restart. If, within five attempts, a successful reset/restart occurs, the Auto Reset/Restart circuit will reset the attempts counted to zero after approximately 10 minutes of continuous operation.
16. Power Interruption: In the event that an input or output power contactor is opened or closed while the drive is activated, no damage to the drive shall result.
17. Short Circuit Protection: In the event of a phase-to-phase short circuit the drive shall be designed to shut down safely without component failure.
18. Single Phase Protection: In the event of a loss of any phase, the drive shall be designed to shut down safely without component failure.
19. Sustained Power Loss: In the event of a sustained power loss, the drive shall be designed to shut down safely without component failure. Upon return of power, the systems shall be designed to automatically return to normal operation.
20. Momentary Power Loss: In the event of a momentary power loss, the drive shall be designed to ride-through a power interruption up to five cycles and shut down safely without component failure. Upon a more extended momentary power loss, the system shall be designed to automatically return to normal operation upon return of power.
21. Stand Alone Operation: To facilitate startup troubleshooting, the drive shall be designed to operate without a motor, or any other equipment connected to the drive output.
22. Start/Stop Control: The drive may be started or stopped by any one of the following:
 - a. A contact closure.
 - b. The speed control signal dropping below or rising above minimum.
 - c. An external 24 Volt dc signal.
 - d. Keypad interface
23. Speed Control: Minimum of (2) analog inputs. The drive will adjust the output frequency in proportion to a 0-10-volt or 4-20 ma analog signal.
24. Minimum and Maximum Speed Control: Adjustable minimum and maximum digital parameters or speed potentiometers for all speed signals. Minimum range shall be 0-80%, field set at 40%. Maximum range shall be 100-0%, field set at 100%.

25. Signal Gain and Offset: Adjustable signal gain (1:1 to 10:1 range) and offset (0-50% of input signal for all speed signals).
26. Automatic Reversing: Reversing terminals to automatically reverse the rotation of the motor(s) shall be available for customer use if so desired. When a contact closure is made across these terminals, the motor shall decelerate from its operating speed to zero at the preset deceleration rate. Upon reaching zero, it shall reverse direction and accelerate to the set speed at the present acceleration rate.
27. Adjustable Accel/Decel: Independently adjustable acceleration and deceleration digital parameters or time potentiometers from at least 30-199 seconds, field set at 90 seconds.
28. Control Isolation: Low voltage logic and 115-volt control circuits shall be electrically isolated from the power circuits. Signal circuit common shall be grounded.
29. Control Adjustments: All control adjustments shall be made without the necessity of an extender board or specialized meters, and from front accessible controls.
30. Diagnostics: A diagnostic fault detection center shall be integral to each VSD, providing an indication of the following fault conditions:
 - a. External fault
 - b. Processor line voltage
 - c. Low ac line voltage
 - d. High ac line voltage
 - e. Current overload
 - f. High dc bus voltage
 - g. VSD output fault
31. Status Lights: Status lights for indications of conditions described in items 1 through 5 shall be provided. An SPDT contact for remote indication of items 2 through 5 shall be provided. Additionally, status lights to show "Power On", "Zero Speed", and "Drive Enabled" shall be provided. All status lights shall be self-contained in the front panel of the unit and shall be duplicated for ease of troubleshooting on the inside of the unit. Status lights shall be red, light-emitting diode type for high visibility and reliability. Status information may be provided by a digital read-out message center.
32. Indicating Lights: Provide indicating lights or a digital read-out message center with selector keypad to display the following information.
 - a. Power On: Lights any time input power is applied to the drive
 - b. Zero Speed: Illuminates whenever the drive is at zero frequency
 - c. Enabled: Lights to indicate that the drive has a start command
 - d. Over Temperature: Upon reaching the over temperature trip point, the light is continuously illuminated
 - e. Current Limit: Indicates that the Accel, Decel or Run Limit circuit is in operation
 - f. Undervoltage: Indicates that an undervoltage trip has occurred
 - g. Overvoltage: Indicates that an overvoltage trip has occurred
 - h. Overcurrent: Indicates that the current rating of the drive has been exceeded and the overcurrent trip circuit has been activated

33. External Alarm Contacts: Single pole, double throw contacts rated 115-volt ac, 28-volt ac, 1 Amp resistive, shall be available for external monitoring. Contacts will change state when any trip condition has occurred.
34. Network Communications: The drive shall have an EIA-485 port with removable terminal blocks. The onboard protocols shall include BACnet MS/TP. Communication cards for BACnet/IP and LonWorks shall be available. Reference Division 25 specifications for the required protocol.
35. Speed Reference Signal: An adjustable signal shall be provided for customer use. This signal shall vary in direct proportion to the drive speed. 0-10V or 4-20mA.
36. User Interface: The VSD shall have the following door mounted user interface devices:
 - a. "Power On" light
 - b. Hand/Off/Auto (or equivalent) selector switch
 - c. Speed potentiometer or keypad control
 - d. Digital Readout with keypad for Frequency information and Diagnostic Display
37. Cooling: The VSD shall be convection-cooled or fan-cooled. The unit shall have high temperature protection.
38. Control Power: A 24-volt dc, control power shall be available for customer use whenever drive input power is applied.
39. External Safeties: Fire alarm interface, safety and temperature control interlock terminals with door mounted "external fault" light.

E. System Operation:

1. Selector switch in the "off" position - the controller run circuit will be open and the system will not operate.
2. Selector switch in the "hand" position - the speeds of the motor will be controlled by the manual speed potentiometer or keypad.
3. Selector switch in the "auto" position - operation will be via the external control input signal with the output speed proportional to the input signal.

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Shop drawing submittals shall include, but not be limited to, the following:

1. Cut sheets of individual speed controllers with construction, dimensions, weights, ratings, voltage, poles, options, and all associated accessories clearly indicated
2. Wiring diagrams for the drive power, bypass and control sections
3. A detailed description of drive operation and adjustable parameters
4. Additional information as required in Section 20 05 03

3.2 INSTALLATION OF ELECTRONIC VARIABLE SPEED DRIVES

- A. General: Install electronic variable speed drives where shown, in accordance with the manufacturer's written instructions, the applicable requirements of the NEC and the NECA's "Standard of Installation", and recognized industry practices to ensure that products serve the intended function.
- B. Supports: Provide all electronic variable speed drives with galvanized angle or other suitable supports where mounting on wall or other rigid surface is impractical. Drives shall not be supported by conduit alone. Where drives are mounted on equipment served, the drive shall not inhibit removal of any service panels or interfere with any required access areas. All drives shall be installed plumb and aligned in the plane of the wall in/on which they are installed.
- C. VFD Output Power Wiring: Provide dedicated output conduits for each VFD to each motor unless otherwise indicated on drawings.
- D. Coordination: The Division 20-28 Contractor shall coordinate electronic variable speed drive selection and installation including, but not limited to, the following:
 - 1. Coordinate power wiring to electronic variable speed drives and served motors with the Division 26 Contractor.
 - 2. Coordinate selection of variable speed drives and served motors to ensure compatibility.
 - 3. Coordinate variable speed drive control interface with controls and sequence of operation specified in Section 25 09 16 and Section 25 09 93.

3.3 STARTUP/TESTING

- A. Pre-Energize Check: The Division 26 Contractor shall check electronic variable speed drive power wiring for continuity of circuits and for short circuits.
- B. Startup Services: A representative of the variable speed drive manufacturer shall provide startup services for each drive including, but not limited to, the following:
 - 1. Check out of drive control and power wiring.
 - 2. Startup drive and demonstrate proper manual, automatic, and bypass operation.
 - 3. Adjust variable speed drive overload protection and other adjustable parameters to suit project requirements.
- C. Motor/Controller Coordination Documentation: Provide motor/controller coordination documents including, but not limited to, the following information in the Operation and Maintenance manuals.
 - 1. Motor size in horsepower
 - 2. Motor full load amps
 - 3. Motor efficiency
 - 4. Motor service factor
 - 5. Size and manufacturer's catalog number of electronic variable speed drives.
 - 6. Setting of electronic variable speed drive overload protection and other adjustable parameters

- D. Motor Rotation: Verify that motor rotation is correct as connected. Where rotation must be changed, the Division 26 Contractor shall reconnect phase conductors to motor leads at motor junction box.

END OF SECTION

SECTION 20 05 48

NOISE AND VIBRATION ISOLATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods Section 20 05 05

1.2 SCOPE

- A. General: Furnish and install vibration isolation supports for all equipment and piping as required to prevent transmission of vibration and noise to the building structure.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. All Pump Equipment and Piping Sections
 - 2. All Air Handling Equipment Sections

1.3 QUALITY ASSURANCE

- A. Expected noise levels in various parts of the building shall conform to noise criteria recommendations as set forth in the ASHRAE 2015 Applications Handbook, **Chapter 47, Table 42**. Refer to ASHRAE 2017 Fundamentals Handbook, **Chapter 7, Figures 7 and 9** for NC and RC curves. The mid-point of the range of NC criteria curves shall apply. It shall be the Contractor's responsibility to select and install vibration isolators that enable the noise criteria standards to be met to the extent that the noise can be controlled by vibration isolators.
- B. All vibration isolation devices, including auxiliary steel bases and pouring forms, shall be designed and furnished by a single manufacturer and supplier.
- C. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Amber/Booth Company, Inc. (Proco Products)
 - 2. Kinetics Noise Control
 - 3. Mason Industries
 - 4. VMC/Korfund

- 5. Vibration Eliminator
- 6. Vibro Acoustics

PART 2 - PRODUCTS

2.1 GENERAL

- A. Unless otherwise noted, equipment driven by motors 2 HP and smaller shall be isolated by means of elastomeric mounts or hangers properly sized for 1/2" deflection.
- B. Unless otherwise noted, spring type vibration isolators shall be used for all equipment driven by motors of 3 HP and larger. Deflections as tabulated are minimums and it shall be the responsibility of the isolation manufacturer to determine the amount of spring deflection required for each isolator to achieve optimum performance, prevent the transmission of objectionable vibration and meet the noise criteria referenced herein.
- C. All spring isolators shall be completely stable in operation and shall be designed for not less than 50% reserve deflection beyond actual operating conditions. Open spring isolators shall be designed such that the KX/KY ratio shall be 1.0 or greater. Spring shall be welded both to the baseplate and the compression plate.
- D. All elastomeric isolators shall be of neoprene or high-quality synthetic rubber with anti-ozone and anti-oxidant additives.
- E. Steel components shall be cleaned and painted. All nuts, bolts, and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with zinc-chromate or metal etching primer.
- F. Height saving brackets used with isolators having 2.5" deflection or greater shall be of the pre-compression type to limit exposed bolt length.
- G. All isolators exposed to the weather shall have PVC, cadmium, or neoprene coated springs and hot dipped galvanized steel components. Aluminum components shall be etched and painted. Nuts, bolts and washers may be zinc-electroplated.
- H. Isolators for equipment installed outdoors shall be designed to provide adequate restraint due to normal wind conditions and to withstand wind loads of 30#/sq. ft. applied to any exposed surface of the isolated equipment.
- I. Axial flow fans operating at 2" of static pressure and above shall be furnished with type TRK isolation thrust resisters to limit displacement to 1/4".

2.2 EQUIPMENT ISOLATION (TABLE 20 05 48-A)

- A. The following table represents the isolator and base types required for various equipment.

TABLE 20 05 48-A

EQUIPMENT	ISOLATOR TYPE	MINIMUM DEFLECTION (IN.)	BASE TYPE
AIR HANDLING UNITS (Externally Isolated)			
FLOOR MOUNTED: UP TO 15 HP	SW	1.0	HKP
20 HP AND OVER	SW	2.0	HKP
SUSPENDED: UP TO 15 HP	BSRA	1.5	---
20 HP AND OVER	BSRA	2.5	----
CURB MOUNTED:	SW	(1.0) (2.0) (3.0)	RTIR
AIR HANDLING UNITS (Internally Isolated)			
FLOOR MOUNTED: UP TO 15 HP	SP-NRE	0.15	HKP
FAN COIL UNITS			
SUSPENDED:	BSRA	0.50	----
FANS - CENTRIFUGAL			
FLOOR MOUNTED: UP TO 15 HP	SW	1.5	HKP
20 HP AND OVER	SW	3.0	CPF/HKP
SUSPENDED: UP TO 15 HP	BSRA	1.5	---
20 HP AND OVER	BSRA	2.5	----
FANS - AXIAL			
FLOOR MOUNTED: UP TO 15 HP	SW	1.5	HKP
20 HP AND OVER	SW	3.0	CPF/HKP
SUSPENDED: UP TO 15 HP	BSRA	1.5	---
20 HP AND OVER	BSRA	2.5	----
FANS - WALL OR CURB MOUNTED	ISOLATORS FURNISHED WITH EQUIPMENT		
IN-LINE PUMPS	NONE	----	----
FLOOR MOUNTED PLUMBING PUMPS	NONE	----	HKP
PACKAGED DOMESTIC WATER PUMPING SYSTEM	SP-NRE	0.15	HKP
FIRE PROTECTION PUMPS	NONE	----	HKP
HVAC PUMPS			
FLOOR MOUNTED: UP TO 5 HP	RSW	1.0	CPF/HKP
7-1/2 HP AND OVER	RSW	2.0	CPF/HKP
ROOF MOUNTED: UP TO 5 HP	SP-NRE	0.15	HKP
7-1/2 HP AND OVER	SP-NRE	0.15	HKP
AIR COMPRESSORS	SW	2.0	HKP
MEDICAL AIR COMPRESSOR	SP-NRE	0.15	HKP
MEDICAL AIR COMPRESSOR	SW	2.0	CPF/HKP *
MEDICAL VACUUM PUMP	SP-NRE	0.15	HKP
MEDICAL VACUUM PUMP	SW	2.0	CPF/HKP *
WATER CHILLING UNITS	SP-NRE	0.15	HKP
WATER CHILLING UNITS	CT	2.0	HKP *
AIR COOLED CONDENSING UNITS			
ROOF MOUNTED: UP TO 5 TONS	SP-NRE	0.15	RTIR
7-1/2 TONS - 20 TONS	CT	1.0	RTIR
ABOVE 20 TONS	CT	2.0	RTIR
WATER HEATERS	----	----	HKP
BOILERS	----	----	HKP
HEAT EXCHANGERS	----	----	HKP

TABLE 20 05 48-A			
EQUIPMENT	ISOLATOR TYPE	MINIMUM DEFLECTION (IN.)	BASE TYPE
COOLING TOWER			
UP TO 499 TONS	CT	3.0	SEE STRUCTURAL DRAWINGS
500 TO 1,000 TONS	CT	3.5	
OVER 1,000 TONS	CT	4.5	

* WHERE MOUNTED ON FLOOR SLAB OVER OCCUPIED SPACE.

2.3 ISOLATOR TYPES

- A. General: Isolator types shall be one or more of the following. Model numbers of Amber/Booth products are included for identification.
- B. Type SW: An adjustable, freestanding, open-spring mounting with combination leveling and equipment fastening bolt. The spring shall be welded to the spring mounting baseplate and compression plate for stability. The isolator shall be designed for a minimum KX/KY of 1.0. An elastomeric pad having a minimum thickness of 1/4" shall be bonded to the baseplate. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion.
- C. Type RSW: An adjustable, freestanding, open-spring for recessed mounting in a Type CPF base. The isolator shall be designed for a minimum KX/KY of 1.0. An elastomeric pad having a minimum thickness of 1/4" shall be bonded to the spring base plate. Nuts, bolts and washers shall be zinc-plated to prevent corrosion.
- D. Type RVD: An elastomeric mounting having a steel baseplate with mounting holes and a threaded insert at the top of the mounting for attaching equipment. All metal parts shall be completely embedded in the elastomeric material. Mounting shall be designed for approximately 1/2" deflection.
- E. Type SP-NRE: A pad type mounting consisting of two layers of 3/8" thick ribbed or waffled elastomeric pads bonded to a 16-gauge galvanized steel separator plate. Pads shall be sized for approximately 20 to 40 psi load and a deflection of 0.12" to 0.16".
- F. Type CT: An adjustable, open-spring isolator having one or more coil springs attached to the top compression plate and a baseplate. An elastomeric pad having a minimum thickness of 1/4" shall be bonded to the baseplate. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion. The spring assembly shall be removable and shall fit within welded steel enclosure consisting of a top plate and rigid lower housing, which serves as a blocking device during installation. Isolated restraining bolts which shall not be engaged during normal operation shall connect the top plate and lower housing to prevent the isolated equipment from rising when drained of water.
- G. Type PBSR: A combination spring and elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, with the addition of a load transfer plate to hold the equipment or piping at a fixed elevation during installation and to permit transferring the load to the spring after installation, a coil spring, spring retainers and elastomeric element.

- H. Type BSA: A spring hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, coil spring, spring retainers, neoprene impregnated fabric washer, and steel washer. This isolator shall incorporate a 30° angularity feature that will permit up to a 15° misalignment of the hanger rod from the vertical without shorting out to the hanger box.
- I. Type BSRA: A combination spring and elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, coil spring, spring retainers, and elastomeric element. This isolator shall incorporate a 30° angularity feature that will permit up to a 15° misalignment of the hanger rod from the vertical without shorting out to the hanger box.
- J. Type PBSA: A spring hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, with the addition of a load transfer plate to hold the equipment or piping at a fixed elevation during installation and to permit transferring the load to the spring after installation, a coil spring, spring retainers, neoprene impregnated fabric washer, and steel washer. This isolator shall incorporate a 30° angularity feature that will permit up to a 15° misalignment of the hanger rod from the vertical without shorting out to the hanger box. Alternately, the hanger shall be of the pre-positioned configuration.
- K. Type PBSRA: A combination spring and elastomeric hanger consisting of a steel box capable of 200% minimum overload without visible deformation, with the addition of a load transfer plate to hold the equipment or piping at a fixed elevation during installation and to permit transferring the load to the spring after installation, a coil spring, spring retainers, and elastomeric element. This isolator shall incorporate a 30° angularity feature that will permit up to a 15° misalignment of the hanger rod from the vertical without shorting out to the hanger box. Alternately, the hanger shall be of the pre-positioned configuration.

2.4 BASE TYPES

- A. Type HKP: A concrete equipment housekeeping pad as specified in Section 20 05 05.
- B. Type CPF: A concrete inertia base, consisting of perimeter steel concrete pouring form (CPF), with reinforcing bars and isolators welded in place. The perimeter steel members shall have a minimum depth of 1/12" of the longest span, but not less than 6" deep. The base shall be sized with a minimum overlap of 4" around the base of the equipment and, in the case of belt-driven equipment, 4" beyond the end of the drive shaft. Fan bases are to be supplied with NEMA standard motor slide rails. The bases for pumps shall be sized to support the suction elbow of horizontal split-case pumps. The bases shall be T-shaped where necessary to conserve space. The CPF base shall be installed over a concrete equipment (housekeeping) pad as specified in Section 20 05 05.
- C. Type RTIR: An extended aluminum rail base for rooftop air conditioning units consisting of a pair of weatherproofed aluminum rails for fastening to equipment and to the roof curb incorporating wind restraints and a continuous air and water seal which is protected from accidental puncture and direct sunlight by an aluminum weather shield. Rails shall incorporate non-adjusting Type SW spring isolators properly spaced around the perimeter according to load distribution of the supported equipment.

- D. Type CURB: An equipment roof curb as specified in Section 20 05 05.

2.5 PIPING ISOLATION

- A. All piping for the systems listed herein shall be isolated by means of spring type vibration isolation hangers or floor mounts as may be required to create the effect of a completely floating system. It shall be the responsibility of the vibration isolation manufacturer to coordinate the selection of piping supports with equipment supports to provide for a carefully engineered system designed to accommodate expansion and contraction while isolating and supporting the pipe and equipment. Piping for the following systems shall be isolated:
1. All piping four (4) inches in diameter and larger, and all piping two inches in diameter within 100 ft. of the pump for pumped domestic water.
 2. All piping two inches in diameter and larger for all other pumped water, air, steam, gas, and engine exhaust systems.
 3. Piping shown in tunnels on the Drawings to be installed on rollers does not require vibration isolation.
- B. Riser diagrams shall be prepared by the vibration isolation manufacturer and submitted for approval. These diagrams shall show anticipated vertical expansion and contraction; initial and final loads on the building structure; initial and final deflections at each support point; spring deflection changes; operating temperatures; and temperature changes. Isolators shall be selected for minimum deflections equal to four (4) times the calculated thermal movement at each support point to minimize load shifts on the structure. If flexible connectors or expansion loops to relieve stress are required in the riser system, they shall be furnished whether shown or not at no additional expense to the Owner or Architect/Engineer. Submittal data shall include certification that the piping system (horizontal and vertical) has been examined for excessive stresses and that none will exist in the design proposed when installed in accordance with the submittals and these specifications.
- C. Hangers for horizontal piping shall be installed at regular intervals as specified in Section 20 05 05. Isolated pipe risers up through 8" shall be supported at intervals of every third floor of the building and every second floor for risers 10" and over, and as shown on the riser schematics on the plans.
- D. The first two piping supports away from any given piece of externally isolated equipment to which piping is connected shall be vibration isolators selected for an operating spring deflection equal to that specified for the equipment isolators. This shall apply whether the remainder of the piping system is or is not isolated by means of spring type vibration isolators.
- E. Condenser Water Piping: The first two supports for condenser water connecting to cooling towers shall have isolators of the same type and deflection as those specified for the towers.
- F. The first three horizontal piping supports away from a riser connection shall have deflections selected to adequately accommodate the riser thermal movement.

- G. Provide Type 301 acoustic seals where isolated piping passes through non-fire rated wall, ceiling or floor openings from equipment rooms into adjoining occupied spaces. The acoustic seals shall consist of an S-shaped molded synthetic rubber seal attached with stainless steel clamps to the pipe wall sleeves and to carrier piping.
- H. Domestic water systems shall have flexible connections where shown.

2.6 PIPING ISOLATOR TYPES

- A. Type PBSA - for first two hangers in suspended horizontal piping adjacent to isolated equipment and for all hangers on 8" and larger pipe.
- B. Type BSA - for remaining hangers in horizontal piping.
- C. Type SW - for pipe risers. Isolator base plates shall be provided with holes for bolting and isolation grommets.

2.7 FLEXIBLE CONNECTORS (NON "FLOATING" SYSTEMS)

- A. Install full line size flexible connectors at the suction and discharge connection of each pump and at other locations as shown on the drawings. All connectors shall be suitable for use at the pressure and temperature encountered at point of operation. End fitting of connectors shall conform to pipe fitting types specified elsewhere and are to be of the following types, as applicable. All flexible connectors shall be Amber/Booth or an approved equal by Mason, Metraflex or Vibration Mountings.

B. Water Service

- 1. Flanged (2-1/2" and larger), Type 2800 - A flanged spherical arch rubber expansion joint constructed of molded reinforced neoprene with integral steel floating flanges, suitable for pressure up to 214 psi (working) and 850 psi (burst) and temperatures up to 180°F. Connectors shall have minimum movement capability of 1/2" compression, 1/2" control units shall be furnished for sizes up through 8" to limit thrust elongation to 3/8". For 10" and larger, the control rods shall be fitted with neoprene bushings for isolation.
- 2. Threaded (2" and smaller), Type SS-PM - A metal hose connector constructed of stainless-steel hose and braid with carbon steel NPT threaded end fittings. Minimum lengths shall conform to the following table:
 - a. 1-1/2" diameter and smaller: 10" long
 - b. 2" diameter and larger: 12" long

C. Steam and Condensate Service

- 1. Flanged (2-1/2" and larger), Type SS-FP - A flanged metal hose connector constructed of stainless-steel hose and braid with carbon steel plate flanges. Minimum lengths shall conform to the following table:
 - a. 2-1/2" through 4": 9" long
 - b. 5" and 6" diameter: 11" long
 - c. 8" diameter: 12" long

- d. 10" diameter: 13" long
- 2. Threaded (2" and smaller), Type SS-PM - Same as for water service.

2.8 DUCTWORK ISOLATION

- A. Ductwork suspended above or below public spaces shall be isolated from the structure by Type BSRA vibration isolators sized for 3/4" deflection. These public spaces, include but are not limited to:
 - 1. Ballroom
 - 2. Meeting Rooms
 - 3. Boardroom
 - 4. Lobby
 - 5. Pre-Function Room
 - 6. Dining Room
- B. Ductwork supported from floors above these areas shall be isolated from structure by Type RSW vibration isolators sized for 3/4" deflection.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Upon startup of internally isolated equipment, shipping restraints shall be released from internal springs to ensure proper function. Verification of operation shall be confirmed by the Vibration Isolation manufacturer, or qualified representative, as described in Paragraph B. below.
- B. Shop drawings submittal data shall include, but not be limited to, the following information:
 - 1. A complete listing of proposed types of isolators for each specified application, including size and deflection information
 - 2. Selection calculations for all isolators
 - 3. Vertical isolation riser diagrams with expansion/contraction calculations
 - 4. Cut sheets for each isolator type to be utilized on the project
 - 5. A clearly outlined procedure for installation and adjusting all isolators
 - 6. Cut sheets on all furnished bases and frames
 - 7. Cut sheets on all flexible connectors and application data as required
 - 8. Piping drawing submittal shall show all isolator locations and types
 - 9. Additional information as specified in Section 20 05 03
 - 10. Additional information as may be required for proper evaluation of the proposed vibration isolation system

3.2 INSTALLATION

- A. The vibration isolation manufacturer, or his qualified representative, shall be responsible for providing such supervision as may be necessary to assure correct installation and adjustment of the isolators and flexible connectors. Upon completion of the installation

and after the system is put into operation, the manufacturer or his representative shall make a final inspection and submit his report in writing certifying the correctness of installation and compliance with approved submittal data.

END OF SECTION

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SECTION 20 07 00
THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods - Section 20 05 05

1.2 SCOPE

- A. Furnish and install thermal insulation for systems as specified in this Section and as shown on the Drawings.
- B. Insulation Protection: All piping and/or duct insulation subject to damage, exposed to the outdoor elements, and/or within parking garage drive lanes shall be covered with factory applied aluminum laminate or 0.016" thick smooth aluminum jacket utilizing longitudinal "zee" closures. Jacket shall be secured at butt joints with 2" wide aluminum straps containing a permanently plastic sealant. Straps shall be centered over butt joints of jacket. Provide 1/2" wide aluminum bands applied on 12" centers. Install the longitudinal joint facing downward to shed water. Furnish end closure and caps to cover completely all valves, fittings, etc. Aluminum jacket for insulated grooved pipe fittings shall be as manufactured by Pro-Tec-T-Kotes, Inc., or approved equal. At the contractor's option, all ductwork insulation (including elastomeric type) exposed to the outdoor elements and/or within parking garage drive lanes may be covered with VentureClad Plus 1579CW-CE, clear embossed 13-ply laminate as manufactured by Venture Tape Corporation. All rigid insulation in unconditioned, ventilated attics open to the outdoors shall be covered with VentureClad 1579CW-CE, clear embossed 13-ply laminate in accordance with the manufacturer's written installation instructions. Venture Clad is not acceptable for pipe covering.
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Miscellaneous Piping - Section 20 21 16
 - 2. Plumbing Piping and Accessories - Section 22 11 16
 - 3. Plumbing Fixtures and Trim - Section 22 42 10
 - 4. HVAC Water Piping Accessories - Section 23 05 10
 - 5. HVAC Water Piping - Section 23 21 13
 - 6. HVAC Pumps - Section 23 21 23
 - 7. Refrigerant Piping - Section 23 23 00

- 8. Ductwork and Sheet Metal - Section 23 31 13
- 9. Air Distribution Devices and Dampers - Section 23 33 10

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

1. Insulation:

- a. Armacell LLC
- b. CertainTeed Corporation
- c. Knauf Insulation
- d. Johns Manville
- e. Owens/Corning
- f. Thermal Ceramics
- g. Resolco
- h. K-Flex
- i. Polyguard Products, Inc.

2. Adhesives/Sealants:

- a. Childers
- b. Foster
- c. Vimasco
- d. Armacell
- e. K-FLex

B. Codes and Standards:

1. Fire/Smoke Ratings: Fire and smoke hazard rating as tested by Procedure ASTM E84, NFPA 255, and UL Classified under UL 723 shall not exceed Flame Spread 25, Smoke Developed 50:

2. Specifications:

- a. Preformed fiberglass - ASTM C547
- b. Fiberglass Blanket - ASTM C553
- c. Polyisocyanurate board - ASTM C591
- d. Expanded closed cell elastomeric - ASTM C534
- e. Preformed Calcium silicate block - ASTM C533, Type I
- f. Cellular glass - ASTM C552
- g. Phenolic foam - ASTM C1126
- h. Fiberglass internal duct liner - ASTM C1071, Type I or II
- i. High Temperature Blanket - ASTM E119 & E814
- j. Aluminum jacket - ASTM B209
- k. Vapor barrier jacket - ASTM C1136
- l. Fiberglass insulation adhesive- ASTM C916
- m. Thermal efficiency test method - ASTM C177
- n. Dimensional standard - ASTM C585

PART 2 - PRODUCTS

2.1 PREFORMED FIBERGLASS INSULATION

- A. General: Insulation material shall be Johns Manville Micro-Lok APT, Owens-Corning ASJ/SSL, or Knauf Earthwool 1000 Degree Pipe Insulation preformed glass fiber pipe insulation.
- B. Conductivity: Preformed glass fiber pipe insulation shall have an average thermal conductivity (K factor) not to exceed 0.23 BTU • IN/HR • SF • °F at 75°F mean temperature and a temperature limit of at least 850°F.
- C. Jacket: The insulation shall include an all-service jacket (ASJ) consisting of a high density, white kraft bonded to aluminum foil and reinforced with fiberglass yarn. The jacket shall include a longitudinal lap with a pressure sensitive tape lap sealing system and matching ASJ butt wraps. Jacket shall comply with ASTM C 1136 Type I.

2.2 FIBERGLASS BLANKET INSULATION

- A. General: Insulation shall be Johns-Manville Microlite EQ100, Owens-Corning Type SoFTR 100, or CertainTeed Type 100, or Knauf Atmosphere 1 PCF duct wrap 1-pound FSK flexible glass fiber blanket.
- B. Conductivity: Insulation shall have an average thermal conductivity (K-value) of no more than 0.27 BTU • IN/HR • SF • °F at 75°F mean temperature and a 250°F temperature limit.
- C. Jacket: Insulation shall be furnished with a factory applied foil-scrim-kraft facing consisting of 0.35 mil aluminum foil reinforced with glass yarn mesh and laminated to 40 pound chemically treated and fire resistant white kraft paper. Jacket shall comply with ASTM C 1136 Type II.

2.3 HIGH TEMPERATURE BLANKET INSULATION

- A. General: Insulation shall be Thermal Ceramics, FireMaster Duct Wrap, FireMaster Duct Wrap+, Unifrax FyreWrap Elite 1.5, or approved equal 2300°F, high temperature, foil encapsulated, blanket insulation, 6-pound density. Core material shall be composed of alumina and silica or biosoluble, low biopersistence, alkaline-earth silicate wool.
- B. Conductivity: Insulation shall have an average thermal resistance (R-value) of 4.5 per inch at 70°F mean temperature.
- C. Fire Protection: Where used for the fire protection of PVC conduit or kitchen hood exhaust ductwork, insulation shall be installed in accordance with the manufacturers written installation instructions to provide 1-hour protection (PVC conduit) or 2-hour protection (hood exhaust duct).

2.4 PIPE INSULATION ACCESSORIES

- A. Protection Shields: Provide protection shields at all clevis hangers as specified in Section 20 05 05, Basic Division 20 Materials and Methods.
- B. Protection Shield Inserts: Where protection shields are used, provide an insert between the piping and the shield 2" longer and 2" wider than the shield, having the same thickness and contour as the adjoining insulation. Inserts shall be minimum 8.0-pound density, minimum 100 psi compressive strength.
1. Owens-Corning Foamglas cellular glass
 2. Johns-Manville Thermo-12 Gold calcium silicate
 3. Resolco Insul-phen phenolic foam
 4. Polyguard Products, Inc. Polyphen Phenolic Foam
- C. Banding: Pipe insulation 2" and larger shall be banded with either of the following:
1. A.J. Gerrard & Company "Steel-Binder" 0.02" thick by 1/2" wide aluminum bands or approved equal.
 2. Thomas & Betts "TY-RAP" nylon ties or approved equal.

2.5 ADHESIVES/SEALANTS/COATINGS

- A. Elastomeric Adhesives:
1. Armacell 520 or 520 BLV (for low VOC)
 2. K-Flex 720-LVOC
 3. Foster 85-75
 4. Childers CP-82
- B. Fiberglass Insulation Adhesive: Adhesives shall comply with ASTM C916, Standard Specification for Adhesives for Duct Thermal Insulation. Adhesive VOC content shall not exceed limits set forth in LEED IEQc 4.1 and SCAQMD Rule #1168.
1. Foster (H.B. Fuller Co.) 85-60
 2. Childers CP-127
- C. Phenolic/Polyisocyanurate Foam Adhesive:
1. Foster 81-33/81-84
 2. Childers CP-96
- D. Vapor Barrier Coatings: Indoor applications, water-based vapor barrier coating for service -20oF to 180oF, permeance 0.013 perms or less at 43 mils dry thickness per ASTM E 96, Procedure B. Coating VOC content shall not exceed limits set forth in LEED IEQc 4.2 and GS-11. Coating must also meet MIL 19565C, Type II as be listed on Qualified Products Database (QPD).
1. Childers CP-38
 2. Foster (H.B. Fuller Co.) 30-80

3. Vimasco 749
4. Armcell WB Finish
5. K-Flex 374

E. Insulation Joint Sealant: Sealant used with phenolic, polyisocyanurate and cellular glass on cold service. Sealant VOC content shall not exceed limits set forth in LEED IEQc 4.1 and SCAQMD Rule #1168 categorized as "other".

1. Foster 95-50
2. Childers CP-76
3. Pittsburgh Corning CW (for cellular glass)

F. Metal Jacketing/Flashing Sealant: Sealant VOC content shall not exceed limits set forth in LEED IEQc 4.1 and SCAQMD Rule #1168 categorized as "other".

1. Foster 95-44
2. Childers CP-76
3. Pittsburgh Corning PC 727

G. Reinforcing Mesh: Mesh used in conjunction with mastics/coating as reinforcement. Fiberglass or synthetic fiber, 10 x 10 or 9 x 8 strands per square inch

1. Foster Mast a Fab
2. Childers Chil Glas #10
3. Pittsburgh Corning PC 79

H. Fungicidal Coating: Water based, fungicidal coating used inside ducts on duct liners.

1. Foster 40-20

2.6 LAVATORIES AND SINKS

A. Supply Pipes: The 3/8" supply pipes and risers to lavatory and sink fixtures exposed beneath the counter, lavatory, or sink, shall be insulated with 1/2" thick insulation. Handi-Lav-Guard insulation kits manufactured by Truebro will be an acceptable alternate.

B. Waste Piping: All exposed lavatory and sink waste piping beneath the counter, lavatory, or sink, shall be insulated as required by Federal, State, and Local requirements for handicap lavatories. Insulation shall be provided with fitted cover to give a finished appearance, color by Architect. Handi-Lav-Guard insulation kits manufactured by Truebro will be acceptable. Method of insulation and sample shall be submitted to Architect for approval.

2.7 INSULATION SCHEDULE

A. General: Insulation thickness shall be at least the minimum value scheduled. Thickness shall be increased where required to prevent condensation or to comply with governing energy code requirements.

1. Piping Systems: (2013 ASHRAE 90.1 and 2015 IECC Requirements)

EQUIPMENT/SYSTEM SURFACE	TYPE	THICKNESS
CHILLED WATER INDOORS / OUTDOORS, 1/2" – 1-1/2"	CELLULAR GLASS	1" / 2"
CHILLED WATER 2" AND LARGER INDOORS / OUTDOORS	CELLULAR GLASS	1-1/2" / 2"
HEATING HOT WATER 1-1/4" AND SMALLER (140°F AND BELOW)	PREFORMED FIBERGLASS	1"
HEATING HOT WATER MAINS 1-1/2" AND LARGER (140°F AND BELOW)	PREFORMED FIBERGLASS	1-1/2"
HEATING HOT WATER MAINS 1-1/4" AND SMALLER (141°F AND ABOVE)	PREFORMED FIBERGLASS	1-1/2"
HEATING HOT WATER MAINS 1-1/2" AND LARGER (141°F AND ABOVE)	PREFORMED FIBERGLASS	2"
STEAM 3" AND SMALLER (250°F AND BELOW)	PREFORMED FIBERGLASS	2-1/2"
STEAM 4" AND LARGER (250°F AND BELOW)	PREFORMED FIBERGLASS	3"
STEAM CONDENSATE 1-1/4" AND SMALLER (250°F AND BELOW)	PREFORMED FIBERGLASS	1-1/2"
STEAM CONDENSATE 1-1/2" AND LARGER (250°F AND BELOW)	PREFORMED FIBERGLASS	2"
STEAM CONDENSATE VENT PIPING	PREFORMED FIBERGLASS	1"
REFRIGERANT AND HOT GAS	ELASTOMERIC	1"
CONDENSATE (COOLING COILS)	PREFORMED FIBERGLASS	1/2"
CONDENSATE (ROOFTOP UNITS)	ELASTOMERIC	1"
DOMESTIC HOT WATER 1-1/4" AND SMALLER	PREFORMED FIBERGLASS	1"
DOMESTIC HOT WATER 1 1/2" AND LARGER	PREFORMED FIBERGLASS	1-1/2"
REFRIGERATED DRINKING WATER	PREFORMED FIBERGLASS	1"
HORIZONTAL STORM DRAIN PIPING*	PREFORMED FIBERGLASS	1"
ROOF DRAIN BODY (UNDERSIDE)*	FIBERGLASS BLANKET	2"
OVERFLOW ROOF DRAIN BODY (UNDERSIDE)*	FIBERGLASS BLANKET	2"
HORIZONTAL AREAWAY DRAIN PIPING*	PREFORMED FIBERGLASS	1"
AREAWAY DRAIN BODY (UNDERSIDE)*	FIBERGLASS BLANKET	2"
FLOOR DRAIN/HUB DRAIN PIPING***	PREFORMED FIBERGLASS	1/2"
FLOOR DRAIN/HUB DRAIN TRAPS, BODIES***	FIBERGLASS BLANKET	2"
DRINKING FOUNTAIN DRAIN PIPING (TO JUNCTION WITH MAIN RISER)***	PREFORMED FIBERGLASS	1/2"
EXPOSED LAVATORY/SINK STOPS/RISERS	MOLDED VINYL	3/16"
EXPOSED LAVATORY/SINK TRAP/TAILOPIECE	MOLDED VINYL	3/16"

EQUIPMENT/SYSTEM SURFACE	TYPE	THICKNESS
ENGINE EXHAUST AND MUFFLER	PREFORMED CALCIUM SILICATE BLOCK	2 @ 1-1/2"
EXISTING PVC WASTE, VENT, STORM PIPING IN RETURN AIR PLENUMS	HIGH TEMPERATURE BLANKET	1-1/2" (1hr)
UNDERGROUND PIPING	(SEE SECTION 23 21 13)	
ICE MACHINE DRAIN PIPING	PREFORMED FIBERGLASS	2"
CHILLED WATER PIPING – HEAT TRACED OR EXPOSED TO FREEZING TEMPERATURES	CELLULAR GLASS	2"
WATER FILLED PIPING OTHER THAN CHILLED WATER – HEAT TRACED OR EXPOSED TO FREEZING TEMPERATURE	PREFORMED FIBERGLASS	2"
FIRE SPRINKLER PIPES IN: MECHANICAL ROOMS, IDF, MDF, AND MAIN ELECTRICAL ROOMS; REFER TO PLANS	PREFORMED FIBERGLASS	2"
* Where located in air-conditioned spaces and plenums only. ** Where located in non-air conditioned spaces and plenums only. *** Systems that receive cooling coil condensate, refrigerated drinking water only, or drainage from ice Machines, or other fluids that can cause piping to condensate.		

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Insulation submittals shall include, but not be limited to, the following:

1. Cut sheets on all insulation products, shield insert blocks, fitting covers, protection jackets, straps, bands, etc., to be used.
2. Cut sheets on all mastic, adhesives, sealants, coatings, anti-microbial agents, etc., and other products to be used with insulation products.
3. Cut sheets on covering and aluminum jacketing materials.
4. Manufacturer's pre-printed installation instructions for all products.

B. LEED Submittals:

1. Product data for Credit IEQ 4.1: For adhesives and sealants and sealant primers used inside the building, include printed statement of VOC content.
2. Product data for Credit IEQ 4.2: For coatings (vapor barrier coatings, lagging adhesive/coatings, etc.) used inside the building, include printed statement of VOC content.

3.2 INSTALLATION

A. General:

1. Install thermal insulation on clean, dry surfaces after all leakage testing and inspection is completed. Any leaking equipment shall be brought to the attention of the Contractor who shall cause these conditions to be corrected. Thermal insulation installation shall be in strict accordance with these Specifications, the Midwest Insulation Contractors Association (MICA) Commercial and Industrial

- Insulation Standards, recognized industry practice, and the manufacturer's printed installation instructions.
2. Where there is evidence of vapor stop failure or "wet" insulation after installation, the insulation shall be removed, and the surface shall be cleaned, dried, and properly reinsulated.
 3. The insulation shall be handled and applied in a manner that will not adversely affect its structural, insulating, or vapor permeability properties.

B. Piping:

1. Condensate Drains:
 - a. All drain lines, including but not limited to sanitary or storm, receiving condensate shall be insulated to a point three feet past vertical connection or according to local codes whichever is more stringent.
 - b. Equipment drains, receiving condensate from cooling coil, shall be fully insulated.
2. Drain Bodies: The substitution of ductwrap insulation for piping insulation is prohibited except on drain bodies.
3. Miscellaneous Valves and Fittings:
 - a. All valve operators, "Pete's Plugs", drain valves, meter and gauge fittings, and other items, which must protrude through the pipe insulation, shall be suitably insulated with removable insulation caps. Bevel and seal insulation and joints at removable caps. Chilled water riser support plates shall be suitably insulated.
 - b. Fittings, flanges, strainers, unions, and valves shall be insulated with pre-molded rigid glass fiber or phenolic foam insulation and finished with two brush coats of vapor barrier mastic with reinforced glass fabric tape embedded in between each coat.
4. Protection Shield Inserts: Protection shield insert blocking shall be thoroughly vapor sealed and finished to match pipe insulation.
5. Protective Jacketing: All piping insulation subject to damage, exposed to the outdoor elements, and/or within parking garage drive lanes shall be covered with factory applied aluminum laminate or 0.016" thick smooth aluminum jacket utilizing longitudinal "zee" closures. Jacket shall be secured at butt joints with 2" wide aluminum straps containing a permanently plastic sealant. Straps shall be centered over butt joints of jacket. Provide 1/2" wide aluminum bands applied on 12" centers. Install the longitudinal joint facing downward to shed water. Furnish end closure and caps to cover completely all valves, fittings, etc.
6. Banding: Band insulation on 24" centers and install at least two (2) bands per section of insulation.
7. Installation of Cellular Glass Insulation: Bore coat insulation with Hydrocal B11. For cold service, apply joint sealant and vapor stop using PITTSEAL CW. Secure insulation with 0.5"x0.016" 304 SS bands. Jacket shall be PITTWRAP CF for straight piping. At fittings, valves and other locations, finish insulation with PITTCOAT 404 coating and PC Fabric 79.
8. Installation of Preformed Fiberglass and Phenolic Foam Insulation: An approved vapor retarder mastic compatible with the insulation shall be applied to all joints

and fittings around the edges of the adjoining pipe/fitting insulation overlapping seam. The preformed fitting insulation shall be finished with two brush coats of vapor barrier mastic with reinforced glass fabric tape embedded in between each coat.

- a. Longitudinal and Butt Joint Vapor Seal: For Cold Service, longitudinal self-sealing laps and butt joint 3" wide self-sealing strips of the insulation jacket shall be further sealed by applying one coat of fire-resistant vapor barrier coating over the entire joint surface. For Hot Service longitudinal joints on insulation systems utilizing factory applied Self Seal or dual factory applied adhesive strips, such as Owens-Corning SSL II, need not be further sealed or banded as required above. For Self-Seal and factory applied adhesive systems, firmly rub all longitudinal and circumferential joints using a squeegee or sealing tool.
 - b. Butt Joint Vapor Stop/Seal: Provide an isolating vapor stop between pipe insulation jacket and the pipe at butt joints of insulation at fittings, flanges, valves, and hangers and at 21-foot intervals on continuous runs using vapor barrier coating. Extend the vapor barrier coating 2" along the insulation jacket, across the face of the insulation, and 4" along the pipe.
9. Installation of Elastomeric Pipe Insulation: Insulation shall be installed in continuous lengths over piping and glued with adhesive at butt joints. Horizontal suspended piping shall be provided with protection shields at hangers. All elastomeric piping insulation exposed to weather or ultra-violet light shall be protected by aluminum jacket or by a factory applied cladding consisting of a laminate of aluminum and polyester with a white finish. Insulation installed indoors but exposed to view shall be finished with two (2) coats of Elastomeric Coating.
10. Installation of Phenolic Foam Pipe Insulation: Install insulation in half sections wherever possible. Seal joints with Childers CP-76 or Foster 95-50 Flextra Sealant. Joints shall be butted tightly. Apply 3" wide 2 mil foil tape to all joints and openings. Fittings shall be 2-piece pre-formed phenolic insulation secured with fiber reinforced tape. Finish fittings, valves, etc., with scrim reinforced vapor retarder mastic which overlaps adjacent jacket by 2". Cover edges with butt strips. Preformed fitting insulation covers may be used as specified herein.
11. Installation of Preformed Calcium Silicate Block Insulation:
- a. All protrusions through the insulation shall be wrapped and/or packed with refractory fiber. All joints and cracks over 1/8" wide shall be sealed with Ryder "V" one Coat.
 - b. Insulation shall be held in place with 20-gauge galvanized wire on 9" centers.
 - c. Horizontal hangers shall be installed inside the calcium silicate insulation and shall be insulated with glass fabric and Foster 46-50 or Childers CP-10/11 weather barrier mastic coated calcium silicate and fiberglass where exposed to possible contact.
 - d. Provide expansion joints in the insulation and aluminum jacket where provided, as recommended by the manufacturer to allow for differential expansion between the exhaust pipe, or flue, insulation, and jacket.

- e. Engine Exhaust Piping: Entire engine exhaust pipe from exhaust manifold expansion connection to outside terminal shall be enclosed in two layers of insulation.
 - 1) Joints for the first and second layers shall be staggered.
 - 2) Apply a third outer layer of 1" thick fiberglass pipe insulation. Finish as required for fiberglass insulation.
 - 3) Insulate exhaust muffler in the same manner as the exhaust piping.
- 12. Heat Traced Insulated Piping: All chilled water, domestic water, fire protection, make-up water, condensate, and sanitary drain piping exposed to weather and cold outdoor temperatures (i.e., open truck docks, open parking garages, outdoors, etc.) subject to freezing shall be heat traced and insulated.

END OF SECTION

SECTION 20 08 00

COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods - Section 20 05 05

1.2 SCOPE

- A. Furnish and install commissioning work as specified herein and in the Commissioning Agent's Specifications.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. All Division 20-28 Sections
 - 2. Division 1, General Commissioning Requirements (01 91 13)

1.3 COMMISSIONING

- A. A complete checkout and test shall be performed to demonstrate and certify that the HVAC systems (Divisions 20-28) are 100% operational and adjusted upon completion of the installation, and that they comply with all applicable codes and specification requirements. Testing shall be performed in two (2) parts and two-way radios for use by test observers shall be provided. The first part of the test shall be a full test of all system components, function, and alarms. All affected subcontractors shall participate in this test. All tests shall be witnessed and acknowledged by written signature of the General Contractor's supervising representative. The Owner's building engineer may elect to observe this first part testing. The first part test results shall be certified and submitted to the Engineer and Owner's Commissioning Agent. The second part of the test shall be a 100% demonstration of basic system functions and alarms for the Engineer, Owner's Commissioning Agent, and Owner's Representative.
- B. The General Contractor shall coordinate the test schedule with the Owner's Commissioning Agent, BCAS Contractor, Electrical Contractor, Mechanical Contractor, Fire Protection Contractor, Fire Alarm Contractor, and other Contractors required to be present for a complete and functional test.

- C. The system checkout and test shall be a comprehensive 100% inspection and functional test of all equipment and software and shall include, but not be limited to, the following:
1. Testing to verify that all control functions specified in the sequence of operation are provided and fully functional as specified and required.
 2. Verification of manual and program control of all start/stop and alarm points, including status indication and alarms.
 3. Verification of all controlled points including setpoint and actual point readouts, remote setpoint change and point alarm.
 4. Verification that all system annunciation text and messages are correct and appropriate.
 5. Functional test of the normal and emergency power building start-up and shutdown routines.
 6. Testing to verify that all systems on emergency power operate as specified in the sequence of operation.
 7. Testing to verify that all specified software is provided and fully implemented.
 8. Display and demonstrate such data entry template and show site specific customizing capability. Demonstrate parameter changes.
 9. Execute menu tree.
 10. Display graphics, demo update.
 11. Execute digital and analog commands in English and graphic mode.
 12. Demonstrate all specified diagnostics.
 13. Demonstrate DDC loop precision and stability via trend logs of inputs and outputs.
 14. Demonstrate BCAS performance via trend logs and command printouts.
 15. Demonstrate scan, update, and alarm responsiveness.
 16. Other testing required by Section 23 05 93.
 17. Other testing required by the Commissioning Agent's Specifications.
- D. Fire Alarm System Interface Testing: Testing of the BCAS interface with the fire alarm system for smoke management, air handling unit shutdown, fire/smoke damper control, duct smoke detector annunciation and other specified interfaces shall be coordinated with the Division 28 fire alarm testing and certification.
- E. Emergency Power Operation Testing: Testing of BCAS operation under emergency shall be coordinated with the Division 26 Contractor such that the testing is conducted along with the Division 26 emergency power system testing and certification.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 20 21 16

MISCELLANEOUS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20 Sections apply to this section:
 - 1. Scope of Work - Section 20 05 01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods - Section 20 05 05

1.2 SCOPE

- A. Furnish and install complete miscellaneous piping systems as specified herein and shown on the Drawings.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Noise and Vibration Isolation - Section 20 05 48
 - 2. Thermal Insulation - Section 20 07 00
 - 3. Plumbing Piping and Accessories - Section 22 11 16
 - 4. HVAC Piping - Section 23 21 13

PART 2 - PRODUCTS

2.1 DRAIN PIPING

- A. General: Drain piping within the building shall be provided from each air handling unit, heat exchanger, pump base drain, vessel overflow, auxiliary drain pan, piping system drain, blowdowns, strainers, and elsewhere where drains are required and shall extend to the nearest floor drain, funnel drain or condensate drainage system. Drains shall be sized as indicated but not less than the equipment drain connection size. Air handling unit drains shall have deep seal traps at each blow-through or draw-through unit to maintain water seal. Provide cleanouts on each change of direction on deep seal traps.
- B. Main Mechanical Rooms: Drains on equipment other than for seals or condensate shall be equipped with full bore ball valves and full size quick disconnect type couplings with caps for drains 1" and larger and hose end adapters for smaller drains.

- C. Materials: The drain piping shall be fabricated of Schedule 40 galvanized steel pipe ASTM A-53 and Class 150, ANSI B16.3 galvanized malleable iron threaded fittings or Type L hard drawn copper tubing and wrought copper solder type fittings and shall be manufactured in the United States of America. The ends of all copper pipe, and the inside of all sweat fittings shall be carefully cleaned before joining with Bridgit solder or Silver Brite 100 using Bridgit burn-resistant soldering flux. No acid shall be used in cleaning or as a flux in soldering joints. Drain piping from rooftop units to roof drains may be Schedule 40 CPVC and painted for UV protection.

PART 3 - EXECUTION

3.1 SUBMITTAL

- A. Shop drawing submittal shall include, but not limited to, the following:
1. Cut sheets marked to clearly indicate all miscellaneous piping system materials to be used.
 2. Piping fabrication drawings indicating plan views and suitable elevations and shall include all accessories and connected equipment.

END OF SECTION

SECTION 22 05 01

SCOPE OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Refer to Specification Section 20 05 00 for related required Codes and Standards.
- C. Refer to Specification Section 20 05 04 for related required Schedule of Submittal Data.
- D. Requirements of Division 20 apply to all Work of Divisions 20-28.

1.2 SCOPE

- A. General: Provide all labor, materials, tools, machinery, equipment, supplies, transportation, storage, utilities, appliances, drayage, hauling, hoisting, excavation, backfill, supervision, and services necessary to complete the Plumbing Work under this Contract. Pay all fees, tap charges, meter charges, permits, licenses, inspections, and special fees assessed by the local utilities and local authorities having jurisdiction. Coordinate Work with the Work of the other trades, so as to resolve conflicts without impeding job progress.
- B. Examine the Architectural, Structural, Fire Suppression, Plumbing, Mechanical and Electrical Drawings and other Divisions, and Sections of the Specifications in order to determine the extent of Work required to be completed under this Division. Failure to examine all the Contract Documents for this Project will not relieve the Contractors of the responsibility to perform all the Work required for a complete, fully operational and satisfactory installation.
- C. Project Location: The Work to be performed under this Contract is all in connection with the construction and erection of [a new building and renovations in an existing building located in Houston, Harris County, Texas.]
- D. Work Included: The Work includes but is not limited to the following systems, equipment, and services:
 - 1. Plumbing system consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. Plumbing fixtures and trim
 - b. Domestic hot water piping
 - c. Domestic cold-water piping
 - d. Electric drinking fountains
 - e. Electric water heaters
 - f. Packaged gas water heaters

- g. Sanitary waste piping
- h. Storm drain piping
- i. Vent piping
- j. Steam to domestic hot water heat exchangers
- k. Water surge and house tanks
- l. Domestic water pumps and controls
- m. Roof and floor drains
- n. Oil interceptors
- o. Grease interceptors
- p. Sewer and water main extensions to 5'-0" beyond perimeter foundation walls
- q. Insulation, controls, safety devices, vibration isolation, etc.
- r. Natural gas piping
- s. Medical gas systems
- t. Brine storage tanks, pumps, piping, and controls
- u. Water softeners
- v. De-ionized water system
- w. Distilled water system
- x. Acid resistant waste and vent piping
- y. Diesel fuel oil storage tanks, pumps, piping, and controls
- z. Main water meter, vault, and piping extension to the building

1.3 WORK OF OTHER DIVISIONS

A. The following is a partial list of work not included in Division 22:

- 1. Electrical connections to motors.
- 2. Engine-driven generator remote fuel storage day tank. Installations of remote fuel storage day tanks are included in the Work of this Division.
- 3. Utility mains and piping 5 feet beyond the foundation walls unless shown otherwise on the Drawings.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 22 11 16

PLUMBING PIPING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 22 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 22 05 93

1.2 SCOPE

- A. The Work of this Section shall include, but not be limited to:
 - 1. Securing and installing plumbing services for the building.
 - 2. A complete domestic hot and cold-water distribution system.
 - 3. A complete sanitary soil waste and vent system.
 - 4. A complete storm water piping system.
 - 5. Miscellaneous plumbing equipment and specialties required for a complete plumbing system as specified.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Owner and Contractor Furnished Equipment - Section 20 05 06
 - 2. Pipe Heat Tracing - Section 20 05 33
 - 3. Noise and Vibration Isolation - Section 20 05 48
 - 4. Thermal Insulation - Section 20 07 00

1.3 QUALITY ASSURANCE

- A. Codes and Standards: All materials, fixtures or devices used or entering into the construction of the plumbing system shall be listed for Uniform Plumbing Code (UPC) or shall conform to Alternate Standards recognized as "equal" by the Authorities Having Jurisdiction.
- B. All grooved components including couplings, fittings, valves, gaskets, and specialties shall be of one manufacturer. All castings shall be dated stamped for quality assurance and traceability.

- C. NSF Compliance: All components used in potable water systems shall be NSF 61 certified and shall be NSF/ANSI 61-G and/or NSF/ANSI 372 certified for lead content. Components for domestic water shall be 3rd Party Certified.
- D. All piping shall be manufactured in the United States of America.

1.4 PLUMBING SERVICES

- A. The Plumbing Contractor shall be responsible for securing all plumbing services necessary for the project as shown on the Drawings.
 - 1. Securing water connection permit from the authority having jurisdiction.
 - 2. Tapping, or arranging for tapping of the city main in accordance with the authority having jurisdiction.
 - 3. Extending water service to meter.
 - 4. Installation of water meter and meter box in accordance with authority having jurisdiction.
 - 5. Extending water services from meter box to building entry.
 - 6. Securing sanitary sewer connection permit from the authority having jurisdiction.
 - 7. Connecting, or arranging for the connection of the sanitary lines(s) into the sanitary sewer in accordance with the authority having jurisdiction.
 - 8. Securing storm sewer connection permit from the authority having jurisdiction.
 - 9. Connection of or arranging for the connection of the storm drain(s) into the storm sewer system in accordance with the authority having jurisdiction.
 - 10. Installing all drainage systems with the proper slope as required by code.
 - 11. Boring and jacking existing streets, driveways, sidewalks, etc., in the city right-of-ways as is necessary. (Where this stipulation cannot be met, it shall be the responsibility of the Plumbing Contractor to secure all necessary permits at his cost to do whatever is required to secure the service from the city or local authority and make whatever repairs necessary after the service is secured.)
 - 12. Arranging with the gas company to have the necessary gas service and properly sized gas meter station located where shown on Drawings.
 - 13. Extending gas service from the gas meter station to the building entry.
- B. The Plumbing Contractor shall be responsible for coordinating plumbing services and site utility work as shown on the Plumbing and Civil Utility Drawings with the General Contractor to determine what work is included in the scope of the Plumbing Subcontract.

1.5 PIPING FABRICATION DRAWINGS

- A. Piping fabrication drawings shall be submitted for all piping in the Central Plant, Mechanical Rooms, and Penthouse and for Equipment connections and all other areas requiring coordination with other trades.
- B. Pipe fabrication drawings shall be double line drawings to scale on 1/4" scale building floor plans and shall indicate pipe size, fittings, valves, accessories, connections, system type, insulation, support requirements, isolator locations and types, pipe elevations and other information required for coordinating with other trades and fabrication of piping.

- C. Pipe fabrication drawings shall be coordinated with other trades and building construction prior to submittal for approval.

1.6 EXPOSED PIPING

- A. All exposed piping for supply, waste, and vent connections to plumbing fixtures and connected equipment in finished areas shall be polished chrome plated unless noted otherwise on the drawings. This shall include piping, fittings and valves. Polished chrome plated sleeves may be used over supply, waste and vent piping provided that the finished installation presents the appearance of a fully chrome plated system.

1.7 PIPE HEAT TRACING (FREEZE PROTECTION)

- A. The Plumbing Contractor shall furnish and install heat tracing cable as specified in Section 20 05 33, where shown on the Drawings, and where piping is exposed to freezing conditions. The entire length of the exposed pipe including all valves, fittings and accessories shall be traced and insulated. Refer to Section 20 07 00 for insulation requirements.

1.8 NO LEAD

- A. Lead Free: Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$ per Safe Drinking Water Act as amended January 4, 2011, Section 1417. All materials and components used in potable water systems shall be lead free.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING

- A. General: The domestic water system in the building shall be designed for pressures up to 150 psi for distribution piping and risers.
- B. Water Service Piping: Water service piping shall be ductile iron, mechanical joint water pipe (ANSI C-110) or Tyton joint water pipe (ANSI C-151) and shall be installed in accordance with manufacturer's recommendations. Water service to the building shall be routed and installed as detailed on the Drawings. No main water service piping shall be permitted under the slab. Water service piping shall have a minimum 24" cover from top of pipe in non-paved areas and 30" cover in paved areas.
- C. Underground Protection: Underground metallic water piping shall be coated with 3M Scotchwrap Pipe Wrap Insulation No. 50, or Tapecoat CT, applied in strict accordance with the manufacturer's recommendations. Machine wrapping of piping is acceptable. Concrete thrust blocks shall be poured at all turns and offsets of mechanical joint piping.
- D. Underslab Piping: Piping underground and piping under the building slab for hose bibbs and equipment stubs shall be no larger than 1" and shall be Type "K" soft drawn copper tubing (ASTM Standard B-88). Piping shall be run continuous from slab penetration to penetration and there shall not be any fittings or connections below the slab. Piping

shall have minimum 24" cover in non-paved areas. Underground piping up to 3" inches above slab penetrations shall be protected as described herein above.

- E. Underground Piping: In general, all underground piping shall be buried in a trench with minimum 24" of cover from top of pipe insulation jacket, and at minimum 12" wider than the combined O.D. of all piping systems within the trench. All backfill material shall be cleaned bank sand.
- F. 3" and Smaller Inside Piping: Water piping, 3" and smaller inside the building shall be type "L" hard drawn copper tubing (ASTM B-88) with wrought copper fittings (ASME B16.22, or ASME B16.18), roll-grooved ends with Victaulic copper grooved end couplings, or copper press fittings Viega ProPress or Nibco NibPress System. Clean and de-burr the insides of all fittings and pipe carefully before joining. Solder shall be Bridgit solder or Silver Brite 100 using Bridgit burn resistant soldering flux. No acids sweating joints. Press fittings shall employ an EPDM o-ring seal and shall be pressed using the tool approved by the system manufacturer. The use of drilled-T connections is not permitted. Press fittings manufactured by Viega or Nibco shall be acceptable if they comply with these specifications.
- G. 4" and Larger Inside Piping: Water piping 4" and larger inside the building shall be Class 250, Schedule 40 galvanized steel domestic water pipe conforming to ASTM A-53 and ANSI B125.2. All piping shall be manufactured by one of the manufacturers listed in the latest edition of the American Petroleum Institute (API) approved manufacturer listing.
- H. Grooved CPVC Pipe Option for 2" and Larger Inside Piping: At the contractor's option only with prior approval by the engineer, CPVC pipe meeting the requirements of ASTM F441 and ASTM D1784 - minimum cell classification 23447 may be provided within the limits of Residential Dwelling Units and Residential Main Riser only. Provide schedule 80 CPVC (ASTM D-2241, ASTM D-1785) with Victaulic grooved fittings and coupling connections only. Solvent welded fittings shall not be used. Reduced pressure ratings must be considered for hot water temperature applications. Refer to the manufacturer's requirements prior to installation.
- I. Fittings:
 - 1. Pipe fittings 4" and larger shall be galvanized malleable iron fittings, or galvanized cast iron flanged fittings per ASME B16.1. Fittings shall be Class 150 for pressures up to 150 psi and Class 250 for pressures above 150 psi and up to 250 psi.
 - 2. Grooved Piping Option:
 - a. For galvanized steel pipe, a grooved piping connection system with "roll grooves or cut-grooves" may be used. All couplings shall be Victaulic Style 807N Installation-Ready Rigid Couplings with angled bolt-pads to achieve rigidity and shall require visual verification only for proper installation without torque requirements. Rigid couplings shall be used at valves and in other areas where piping system rigidity meeting ASME B31 hanging requirements. Victaulic Style 877N Installation-Ready® Flexible Couplings may be used in approved locations to accommodate vibration, deflection or expansion/contraction as designed within accordance of the manufacturers' recommendations and shall be

reviewed by Victaulic Engineering Services. All gaskets shall be grade "P" Fluoroelastomer compound with red and blue color code designed for operating temperatures from 0 deg F to +180 deg F.

3. Taps to mains shall be made using Victaulic Style 72 or Style 920, galvanized mechanical tees. Mechanical tee couplings with U-bolts such as Victaulic style 921 shall not be permitted. Flanged connections shall be made using Victaulic Style 741. Fittings for elbows, tees, reducers, etc. shall be Victaulic galvanized full flow fittings. All grooved piping connection materials shall be utilized with the manufacturer's recommended groove cutting tool. All grooved piping couplings and fittings used in conjunction with companion grooved fittings shall be by the same manufacturer. The use of boltless couplings and reducing couplings is prohibited. All wetted surfaces in the piping system shall be hot dip galvanized and all proposed grooved piping connection materials shall be suitable for domestic water use at the temperatures and pressures at the point of application. Painted couplings may be used where they meet the above requirements.
 - a. Manufacturers: If they comply with these Specifications, all grooved piping products shall be manufactured by Victaulic only. No substitutions will be allowed. Installation: The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).
- J. Copper Option: Copper pipe type "L" hard drawn in sizes 2-1/2", 3", 4", and 6" for 150 psig systems may be used and assembled with Victaulic style 607N couplings.. All fittings shall be Victaulic style 600 series with =Grade "P" Fluoroelastomer compound with red and blue color code designed for operating temperatures up to +180 deg F full flow with grooved ends manufactured to copper-tube dimensions. (Flaring of tube or fitting ends to accommodate alternate size couplings is not permitted). Piping shall be roll grooved utilizing the grooving system manufacturer's roll-grooving machine. Couplings and fittings shall be of one manufacturer.
- K. Water Hammer Arrestors (Shock Arrestors): The following water hammer arrestors are designed for installation in sealed walls without an access panel. Water hammer arrestors shall be provided on both hot and cold-water lines serving fixtures or equipment using flush valves or quick-closing valves. Water hammer arrestors are to be sized according to the number of fixture units and installed per manufacturer's recommendations. Contractor fabricated pipe type air chambers are not allowed. Check applicable codes which may require access in walls or ceilings. Verify size of unit in conformance to PDI Standards.
 1. Precision Plumbing Products, Inc. Model Series SC, PDI WH-201, piston actuated, factory sealed, seamless hard drawn Type "L" copper barrel with threaded ends.
 2. Sioux Chief Manufacturing Company, Inc. Model Series 650, PDI WH-201, piston actuated, factory sealed, seamless hard drawn Type "L" copper barrel with threaded ends.

- L. Minimum Size: The minimum size of water piping on the project shall be 1/2" on fixture drops and 3/4" on risers. Final fixture connection sizes shall be as specified or shown on the drawings.
- M. Isolation Valves: Each fixture, device or connection to equipment shall have a stop valve to isolate that fixture without shutting down any other portion of the system.

2.2 VALVES

- A. Furnish and install valves as required, specified and shown on the drawings.
- B. Gate valves or Butterfly valves shall be used for all riser shutoff and zone isolation applications. Gate, Butterfly, or Ball valves shall be used for fixture bank isolation, equipment isolation and other local isolation applications. Globe valves shall be used for throttling and balancing applications unless noted otherwise on the Drawings.
- C. Bronze bodied valves, involving internal components, shall contain no more than 15% zinc. Where a brass valve is specifically called out in the specifications or drawings, the valve body and all internal components shall be resistant to dezincification and stress corrosion cracking as defined in NSF/ANSI Standard 14. Submittals shall include a report indicating the results of testing conducted in accordance with ISO 6509 "Corrosion of metal and alloys - Determination of dezincification resistance of brass".
- D. Acceptable Manufacturers:
 - 1. Globe, Gate, and Check Valves:
 - a. Nibco
 - b. Rigid
 - c. Viega ProPress
 - d. Keystone
 - 2. Ball Valves, Butterfly Valves:
 - a. Nibco
 - b. Kitz
 - c. Hammond
 - d. Stockham
 - e. Apollo
 - f. Jomar
 - g. Grinnell
 - h. Victaulic
 - i. Milwaukee Valve
 - 3. Balancing Valves:
 - a. Armstrong
 - b. Victaulic
 - c. Taco
 - d. Nibco

E. Globe Valves:

1. Globe valves 2" and smaller shall be Class 125 bronze globe valves with screw-in bonnet, integral seat and removable disc. Valves shall be rated for 200 psi CWP or 300 WOG and shall conform to MSS SP-80. Valves shall be Milwaukee Valve 1502, or equal by listed manufacturer.
2. Globe valves 2-1/2" and larger shall be bronze mounted Class 125 iron body, outside screw and yoke globe valves with bolted bonnets and renewable seat and disc. Valves shall be rated for 200 psi CWP or 200 psi WOG and shall conform to MSS SP-85. Valves shall be Milwaukee F-2981M, or equal by listed manufacturer.

F. Gate Valves:

1. Gate Valves 2" and smaller shall be Class 125 bronze gate valves with screw-in bonnet, non-rising stem and solid wedge. ASTM B584 C87850 or C89833 Alloy. Valves shall be rated for 200 psi CWP or 300 psi WOG and shall conform to MSS SP-80. Valves shall be Nibco S/T-113-LF, Milwaukee Valve UP105 or UP115, or equal by listed manufacturer.
2. Gate valves 2-1/2" and larger shall be bronze mounted Class 125 iron body, outside screw and yoke gate valves with bolted bonnets and solid wedges. Valves shall be rated for 200 psi CWP or 200 psi WOG and shall conform to MSS SP-70. Valves shall be Nibco F-637-33, Milwaukee F-2885M, or equal by listed manufacturer.

G. Butterfly Valves:

1. Butterfly valves 2-1/2" to 6" shall be lever operated and provide bi-directional dead-end service without a downstream flange, and bubble tight shutoff at 200 psi. Valves shall be constructed of ductile iron with an aluminum bronze disc. Valve shall include a molded-in EPDM liner and a stainless-steel stem with copper bushings. Valve shall be rated for 200 psi CWP and designed to meet MSS-SP-67. Valve will carry the NSF/ANSI 372/61 rating for lead-free. Valve shall be NIBCO 2D-2000-3 or equal, by listed manufacturer.
2. Butterfly valves 6" and larger shall be gear operated and provide bi-directional dead-end service without a downstream flange, and bubble tight shutoff at 200 psi. Valves shall be constructed of ductile iron with aluminum bronze disc. Valve shall include a molded-in EPDM liner and a stainless-steel stem with copper bushings. Valve shall be rated for 200 psi CWP and designed to meet MSS-SP-67. Valve will carry the NSF/ANSI 372/61 rating for lead-free. Valve shall be NIBCO 2D-2000-5 or equal, by listed manufacturer.
3. Grooved End Butterfly valves for galvanized, copper, CPVC, or stainless steel grooved piping systems 2-1/2" meeting the specification requirements shall be used. Valves 2 1/2" to 4" shall be lever operated. 6" and larger shall be gear operated. Valve shall be rated for 300 psi maximum pressure rating. Valves shall be Victaulic, selected for the appropriate piping system as specified. Where

grooved systems are installed, grooved Victaulic valves shall be installed. The use of flange adapters on lug or wafer style butterfly valves shall not be allowed.

- a. For Copper Grooved Systems: Valve shall be constructed of cast brass body to UNS C87850. (Alloy code shall be cast or stamped into the valve body.) Aluminum bronze disc to UNS C95500, with pressure responsive Grade "P" fluoroelastomer seat. Stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating. Bubble tight, dead-end or bi-directional service, with memory stop for throttling, metering or balancing service. Valve may be automated with electric, pneumatic, or hydraulic operators. Valve shall be certified to NSF 61 Hot/Cold and NSF 372 Low Lead. Valves shall be Victaulic Series 608N.
- b. For Stainless Steel, Galvanized Carbon Steel, and CPVC Grooved Systems: Valve construction and performance shall meet or exceed MSS-SP-67 requirements. Valve body and disc shall be constructed of stainless steel to ASTM A351 Grade CF8M, with pressure responsive Grade "P" fluoroelastomer seat. Stem shall be offset from the disc centerline to provide complete 360-degree circumferential seat. Bubble tight, dead-end or bi-directional service, with memory stop for throttling, metering or balancing service. Valve shall be certified to NSF 61 Hot/Cold and NSF 372 Low Lead. Valves shall be Victaulic Series 861.

H. Ball Valves:

1. Ball valves 2" and smaller shall be two-piece body bronze valves of a full port design, reinforced two-piece Teflon seat, blow-out proof stem, stainless steel ball and stem. ASTM B584 Alloy C87600 or C89833. Valves shall be rated for 600 psi CWP or 600 psi WOG and shall conform to Federal Specification WW-V-35B. Valves shall be Nibco S/T-585-66-LF, Watts, or Rigid.

I. Check Valves:

1. Check valves 2" and smaller shall be Class 125 bronze spring loaded in-line. B584 C87850 or C89833 Alloy. Valves shall be rated for 200 psi CWP or 300 psi WOG and shall conform to MSS SP-80. Valves shall be Nibco 480 series, or Watts 600 series.
2. Check valves 2-1/2" and larger shall be stainless steel mounted Class 125 ductile or cast-iron body swing check valves with bolted bonnets and renewable seat and disc. Valves shall be rated for 200 psi CWP or 200 psi WOG and shall conform to MSS SP-71, Type 1. Valves shall be Nibco F-908 series, or Watts 410 series.
3. Manual Balancing Valves: Balancing valves for the domestic hot water system shall be ANSI/NSF 61 Hot/Cold and ANSI/NSF 372 low lead certified Nibco or Watts balancing valves. Valves shall be Y-pattern globe type with fixed orifice, low lead brass CC768S body construction, brass plug with EPDM O-ring seat seal. Valve shall include metering test ports and calibrated hand wheel with position readout and memory stops. Valve shall be rated for a maximum temperature of 248°F and a maximum pressure of 400 psi. The Contractor shall furnish a differential pressure gauge for Contractor use in balancing the hot water

system. After balancing and verification is complete, the differential pressure gauge shall be turned over to the Owner at the time of Substantial Completion.

J. Backflow Prevention and Cross Contamination:

1. A backflow control unit shall be installed at all locations in the domestic water system as follows:
 - a. Where a cross connection or potential cross connection could result in introduction of a health contaminant or non-health pollutant into the domestic water supply system.
 - b. Where required by the authority having jurisdiction.
 - c. Where recommended by the American Water Works Association (AWWA) Manual M14.
 - d. Where shown on the Drawings.
2. Backflow shall be controlled by one of the following methods or types of assemblies:
 - a. Air gap (AG)
3. The domestic water system shall be protected at terminations and equipment connections by methods and devices shown in AWWA Manual M14, Table 4-1.
4. Building premises isolation from the Utility shall utilize devices listed in AWWA Manual M14, Table 4-2.
5. Backflow prevention products manufactured by Watts, are acceptable provided they meet or exceed test standards of American Society of Sanitary Engineers (ASSE).
6. All new pipes, fittings, and related products must conform to American National Standards Institute/National Sanitation Foundation ANSI/NSF Standard 61 (including Annex G) and must be certified by an organization accredited by ANSI.
7. Underground Systems: Routing and crossing underground water and sanitary lines shall follow rules established by the local authority having jurisdiction for prevention of cross contamination.

K. Relief Valves:

1. Furnish and install relief valves where required and as indicated on the Drawings. Relief valve capacity shall be as required by the applicable code and as scheduled or as shown on the Drawings.
2. Relief valves shall be suitable for the working pressure and temperature of the system in which they are installed. Refer to Section 20 05 02, Design Criteria.
3. Inlet and outlet piping from the relief valve shall be at least the size of the valve connections unless otherwise indicated on the Drawings.
4. Liquid relief valves shall be direct spring-loaded type with a cast iron, bronze or steel body and stainless steel or bronze trim, lifting lever, and ASME Unfired Pressure Vessel Code stamp. Valves shall be selected for a maximum overpressure of 10%.
5. If they comply with these Specifications, relief valves manufactured by Kunkel, Watts, Armstrong or Consolidated will be acceptable.

- L. Solenoid Valves: Cold water solenoid valves shall be similar to ASCO Red-Hat Series 8210, 120/1/60, brass body with Buna "N" Seals and Discs, 150 psi operating pressure. Valves shall be normally open or normally closed as called for in drawings.
- M. If it complies with these specifications, valves manufactured by one of the manufacturers listed above will be acceptable.

2.3 SERVICE WATER METERS

- A. Water meters shall be of the turbine type with magnetic drive and hermetically sealed register. Meter body casting shall be bronze. Trim shall be stainless steel.
- B. Flow shall be straight through the meter at all flow rates. All water measured by the meter shall be recorded on a single totalizing register.
- C. Meters shall meet or exceed AWWA Standard C-701-78 for Class II turbine meters at both normal flow ranges and sustained flow limits and must be approved for potable water use by the City Water Department. Meters shall be certified compliant with NSF61 Annex G, and shall comply with NSF61 Annex F.
- D. Meter shall be installed in accordance with the manufacturer's written recommendations. Provide a minimum of seven (7) pipe diameters of straight pipe immediately in front of the meter assembly and a minimum of five (5) pipe diameters of straight pipe immediately downstream of the meter assembly. Throttling valves, control valves, check valves, backflow preventers, or pressure reducing valves shall not be installed upstream of any domestic water meter regardless of pipe separation. Reducer connections to water meter assemblies where used shall be of the tapered concentric type. Reducing flanges and eccentric step-type reducers are unacceptable.
- E. Meters shall be furnished for various locations as noted below and shall be approved equal to the Sensus Model numbers listed:
 - 1. Main Domestic Water Service: Neptune HP Turbine (flanged connections).
 - 2. Cooling Tower Make-up: Neptune HP Turbine with flanged ends and 3" bronze strainer.
 - 3. Cooling Tower Blowdown: Neptune HP Turbine with flanged ends and 2" bronze strainer.
- F. Manufacturers: If they comply with these Specifications, water meters manufactured by Hersey, Sensus, Badger, Neptune, or an approved equal will be acceptable.
- G. Remote Readout: Provide one (1) water meter remote readout at location indicated on the Drawings. Architect to detail minimum 6" x 6" x 2" deep weatherproof enclosure suitable for installation of remote readout.
- H. Provide pulse to D.C. converter with 4-20 mA output proportional to flow rate for remote monitoring by the Building Control and Automation System (BCAS).

2.4 SANITARY SOIL WASTE AND VENT PIPING

- A. Below Ground: All underground waste and vent piping, including turns to the vertical to 12" above the grade floor slab, shall be constructed of service weight (SV) hub and spigot cast iron soil pipe and fittings (ANSI A.112.5, ASTM A74) with positive sealing neoprene gasket (ASTM C-564) joints. Gaskets shall be installed using "Lubrifast" lubricant/sealant. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute  and listed by NSF[®] International. Pour concrete thrust blocks at all below grade turns and offsets for waste piping 6" and larger.
1. PVC Option: At the contractor's option, PVC pipe may be provided underground under the building floor slab. Provide schedule 40 PVC (ASTM D-2241, ASTM D-1785) with socket fittings and solvent welded connections. Bedding for PVC piping shall be in accordance with the requirements of ASTM D2321 to limit deflection of the pipe wall.
- B. Above Ground: Horizontal and vertical waste and vent stacks above grade shall be service weight (SV) hub and spigot cast iron pipe and fittings (ANSI A.112.5, ASTM A74) with positive sealing neoprene (ASTM C-564) gasket joints. Gaskets shall be installed using "Lubrifast" lubricant/sealant. All horizontal stack offsets shall be joint-strapped and supported using riser clamps and threaded rod. For 4" and 6" hubless piping, Contractor may use Holdrite 117 Series No Hub Fitting Restrainer in lieu of clamps and rods. Use hubless service weight cast iron (CISPI-301) pipe, fittings, and joints (ASTM C1540-20/ASTM C-564) on piping 6" and smaller. Couplings for hubless pipe shall be heavy-duty shielded couplings as defined in ASTM C1540 with a minimum of four clamps. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute  and listed by NSF[®] International. Arrange piping to eliminate joints in telephone and electrical rooms wherever possible. If joints must be made in these rooms, make up all hubless joints in telephone and electrical equipment rooms with "Lubrifast" joining material.
- C. Horizontal and vertical fixture and vent manifolds shall be connected with "No-Hub" cast iron soil pipe and fittings (CISPI-301) assembled with Stainless Steel No-Hub Coupling Assemblies meeting ASTM C1540-20 having a minimum of four clamps per coupling.
- D. Slope all waste and vent piping in accordance with local codes.
- E. This contractor shall be responsible for providing and connecting Mechanical Equipment condensate drains, drain receptacles and receptacle piping to the sanitary sewer system.
- F. Provide and install all cleanouts indicated and/or required by local codes.
- G. Cast iron pipe shall be as manufactured by Tyler Pipe, or Charlotte Pipe and Foundry.

2.5 GREASE TRAPS AND SAMPLING WELLS

- A. Furnish and install grease traps and sampling wells as shown on the drawings and required by local authorities. Grease traps and sampling wells may be pre-cast or cast-in-place concrete. Coordinate forming and pouring or purchase and setting of grease

traps with the General Contractor. Grease trap shall be manufactured by Park Equipment Company, Hydro Recycle, or an approved equal.

2.6 OIL SEPARATORS

- A. Furnish and install oil separators as shown on the drawings and required by local authorities. Oil separators shall be all-welded 1/4" steel 350 GPM intermittent flow, 6" hub bed inlet and outlet with tapped outlet vent connection, 6" internal fume vent, 3" adjustable oil draw-off, visible double-wall outside trap seal, removable filter screen, non-removable separator screen, 3/8" non-skid diamond tread plate cover reinforced for heavy traffic, cover secured with stainless steel bolts, extra heavy leak-proof gasket. Acid resistant coating inside and bituminous coating outside.
- B. Furnish and install oil separators as shown on the drawings and required by local authorities. Oil separators shall be pre-cast concrete. Coordinate purchase and setting of oil separators with the General Contractor. Oil separators shall be manufactured by Park Equipment Company, Hydro Recycle, or an approved equal.

2.7 STORM WATER PIPING - BUILDING

- A. Below Ground: All underground storm water piping including turns to the vertical to 12" above the grade floor slab, shall be constructed of service weight (SV) hub and spigot cast iron soil pipe and fittings (ANSI A.112.5, ASTM A74) with positive sealing neoprene gasket (ASTM C-564) joints. Gaskets shall be installed using "Lubrifest" lubricant/sealant. Hubless service weight cast iron (CISPI-301) pipe, fittings and joints meeting ASTM C1540-20 may be used on all piping 10" or smaller. Couplings for hubless pipe shall be heavy-duty shielded couplings as defined in ASTM C1540 with a minimum of four clamps. Pour concrete thrust blocks at all below grade turns and offsets for storm piping 6" and larger.
 - 1. PVC Option: At the contractor's option, PVC pipe may be provided underground under the building floor slab. Provide schedule 40 PVC (ASTM D-2441, ASTM D-1785) with socket fittings and solvent welded connections. Bedding for PVC piping shall be in accordance with the requirements of ASTM D2321 to limit deflection of the pipe wall.
- B. Above Ground: All storm drainage piping above ground within the building shall be service weight (SV) hub and spigot cast-iron pipe and fittings (ANSI A.112.5, ASTM A74) with positive sealing neoprene gasket joints (ASTM C-564). Gaskets shall be installed using "Lubrifest" lubricant/sealant. All horizontal stack offsets shall be joint-strapped and supported using riser clamps and threaded rod. For 4" and 6" hubless piping, Contractor may use Holdrite 117 Series No Hub Fitting Restrainer in lieu of clamps and rods. Use hubless service weight cast iron (CISPI-301) pipe, fittings, and joints (ASTM C1540-20/C-564) on piping 6" and smaller. Couplings for hubless pipe shall be heavy-duty shielded couplings as defined in ASTM C1540 with a minimum of four clamps. Arrange piping to eliminate joints in telephone and electrical rooms wherever possible. If joints must be made in these rooms, make up all hubless joints in telephone and electrical equipment rooms with "Lubrifest" joining material.
 - 1. Grooved Galvanized Carbon Steel Option: At the contractor's option, grooved galvanized carbon steel pipe may be provided for the horizontal and vertical

waste and vent above grade. Couplings shall be Victaulic 107/177 for 2" to 12" or Victaulic AGS W07/W77 for 14" and larger. Grooved fittings are allowed. Victaulic flexible couplings may be used in approved locations to accommodate for pipe movement such as expansion/contraction, vibration, or pipe offsets.

- C. Provide and install all cleanouts indicated and/or required by local codes.
- D. Cast iron pipe shall be as manufactured by Tyler Pipe, Charlotte Pipe and Foundry, or MWI Cast Iron Products.

2.8 SEWAGE EJECTOR AND SUMP PUMP DISCHARGE PIPING

- A. All pumped wastes and drains, from the pump discharge to the corresponding horizontal gravity main shall be Schedule 40 galvanized steel conforming to ASTM A-53 with Class 150 galvanized malleable iron screw-fittings (ANSI B16.3) or galvanized grooved end fittings (ASTM A-47 or ASTM A-536) joined with Victaulic Style 77 or Style 07 couplings and EPDM Flush-Seal gaskets, or Gruvlok 7000/7401 couplings with Flush-Gap gaskets.
- B. Underground discharge piping shall be protected as specified herein for DOMESTIC WATER PIPING.
- C. Each pump discharge shall be carried separately to the horizontal gravity main and connected into the top of the horizontal gravity main with a wye fitting.

2.9 PLUMBING PIPING HANGER SPACING

- A. Maximum spacing between piping hangers shall be in accordance with the following table:

SIZE OF PIPING	DISTANCE BETWEEN SUPPORTS	
	COPPER/GALVANIZED STEEL	CAST IRON/GLASS
3/4"	6'	5'
1"	7'	5'
1-1/4"	8'	5'
1-1/2"	9'	5'
2" AND LARGER	10'	5'

- B. Supports shall be arranged so as to be near the weakest point of the span such as joints, turns and at the base of all vertical to horizontal offsets and at all waste traps.

2.10 CHASE AND WALL PIPING SUPPORTS

- A. All piping whether sanitary or water shall be rigidly installed in all chases or walls.
- B. Support inside the chase or wall for Sanitary Waste and Vent Piping shall be accomplished by utilizing fixture carrier bolt-downs, "UNI-STRUT" or similar structural

bracing system, "U-bolts", nuts and lock-washers, all bolted to the floor and to the piping system.

- C. Support for Water Piping or other similar service piping shall be accomplished by using a "system" designed for that purpose. An approved system shall consist of preformed steel supports which shall be installed between studs or joints and preformed nonmetallic pipe holder inserts which are designed to rigidly support or hold the piping to the steel supports.
- D. In no case shall Sanitary Sewer Waste or Vent Piping depend on blocks, brick, stone or wood sleepers for its final support. In no case shall Water Piping or similar service piping depend on its final support on "tie-wires", soldering or brazing to metal studs or joints.
- E. Support system shall be as manufactured by "HOLDRITE" or an approved equal.

2.11 DRAIN PANS

- A. Furnish and install galvanized sheet metal drain pans under piping where shown on the Drawings and under all domestic water, waste, and storm drain piping installed in the ceiling space in the following locations:
 - 1. Utility Company Transformer Vault
 - 2. Electrical Rooms
 - 3. Telephone Equipment Rooms
 - 4. IDF Rooms
 - 5. Audio/Visual Equipment Rooms
 - 6. Food Preparation Areas
 - 7. Food Serving Areas
 - 8. Food Storage Areas
 - 9. Intensive Care Rooms
 - 10. Imaging Rooms
- B. Drain pans shall be 3" deep, minimum 16-gauge galvanized steel with watertight solder joints. Drain pans shall be 3" wider in each dimension than the piping protected and shall be chain suspended. Pans shall be cross-broken or sloped to a 1/2" coupling welded to the pan for drain line connection.
- C. Route 1/2" copper or galvanized steel drain lines from each drain pan and terminate through the ceiling in "tell-tale" fashion above the nearest general use plumbing fixture. Drain pan and "tell-tale" locations shall be shown on the Record Drawings. A chrome escutcheon shall be provided where the drain line passes through the ceiling.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Submittals shall include, but not be limited to, the following:
 - 1. Cut sheets for the following plumbing products:

- a. Domestic water pipe, fittings, solder, etc.
 - b. Valves
 - c. Backflow preventers
 - d. Water meters
 - e. Sanitary soil waste and vent pipe and fittings
 - f. Sanitary soil waste and vent piping joint material
 - g. Storm water piping and fittings
 - h. Storm water piping and joint materials
 - i. Grease traps and sampling wells
 - j. Oil separators
 - k. Chase and wall pipe supports
 - l. Drain pans
2. Piping fabrication drawings.
 3. Additional information as required by Section 20 05 03.
 4. Grooved products shall be shown on drawings and product submittals and shall be specifically identified with the applicable style or series number.

3.2 INSTALLATION

- A. General: Route all piping parallel or perpendicular to building lines. Grade piping for drainage and install hose connection drain valves at all system low points.
- B. Copper Pipe: All copper water piping shall be completely isolated from metal hangers, metal studs or any other electrically conductive building components. Provide dielectric unions at all connections between copper and galvanized pipe.
- C. CPVC Pipe: At the contractor's option the use of CPVC piping as a contractor's option for domestic water systems shall be approved prior by the engineer of record and shall be installed using the Victaulic PSG-300 grooved CPVC couplings, fittings and valves in accordance with the manufacture's requirements and specifications herein. Solvent welded or other joining methods shall not be allowed.
- D. Manufacturer's Instructions: Install all materials in accordance with the manufacturers written installation instructions.
- E. Domestic water piping shall be hydrostatically tested at 1.5 times system design pressure as specified in Section 22 05 93.
- F. Refer to Section 20 05 05 for domestic water pipe cleaning and sterilization.

3.3 CLEANING AND ADJUSTING

- C. This Contractor shall furnish all labor, tools, instruments and supervision required in the performance of all tests as specified in Section 22 05 93. All fixtures shall be cleaned and in good working order at project completion.

END OF SECTION

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SECTION 23 05 01

SCOPE OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Refer to Specification Section 20 05 00 for related required Codes and Standards.
- C. Refer to Specification Section 20 05 04 for related required Schedule of Submittal Data.
- D. Requirements of Division 20 apply to all Work of Divisions 20-28.

1.2 SCOPE

- A. Work Included: The Work includes but is not limited to the following systems, equipment, and services:
 - 1. A chilled water-cooling system consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. Water chilling units
 - b. Heat exchangers
 - c. Chilled water pumps
 - d. Chilled water piping
 - e. Water treatment
 - f. Insulation, controls, safety devices, vibration isolation, etc.
 - 2. A DX cooling system consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. DX air cooled condensing units
 - b. DX air cooled split system air conditioning units
 - c. Refrigerant piping
 - d. Insulation, controls, safety devices, vibration isolation, etc.
 - 3. A condenser water system consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. Cooling towers
 - b. Condenser water pumps
 - c. Condenser water piping
 - d. Water temperature controls
 - e. Cooling tower make-up water controls
 - f. Water treatment system

4. Roof-top package air conditioning system consisting, or all items indicated on the Drawings and/or specified herein such as:
 - a. Manufacturer's roof curb
 - b. Refrigerant compressors, condenser fan motors, and supply fan motors
 - c. Vibration isolation, refrigerant piping, drains, and coils
 - d. Insulation, controls, accessories, and filters etc.
5. Factory-built air handling units consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. Chilled water-cooling coils.
 - b. Electric heating coils.
 - c. Hot water heating coils.
 - d. DX refrigerant cooling coils.
 - e. Vibration isolation, housing, blowers, insulation, drain pans with drains, filters, temperature controls, etc.
6. A hot water heating system consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. Boilers
 - b. Hot water pumps
 - c. Heat exchangers
 - d. Hot water piping
 - e. Heating coils
 - f. Hot water unit heaters
 - g. Water treatment
 - h. Insulation, controls, safety devices, vibration isolation, etc.
7. A steam heating system consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. Steam boilers
 - b. Steam to hot water exchangers
 - c. Steam and condensate return piping
 - d. Steam heating coils
 - e. Steam unit heaters
 - f. Steam sterilizers
 - g. Water treatment
 - h. Steam humidifiers
 - i. Insulation, controls, safety devices, vibration isolation, etc.
8. Electric heating system consisting of all items indicated on the Drawings and/or specified herein, such as:
 - a. Electric heating coils in HVAC terminal units
 - b. Electric duct heaters
 - c. Electric unit heaters
 - d. Electric heating convectors

- e. Electric cabinet heaters
 - f. Controls, insulation, vibration isolation, etc.
9. Air distribution system consisting of all items indicated on the Drawings and/or specified herein, such as:
- a. Sheet metal ductwork
 - b. Fire Rated Ductwork Systems
 - c. Grilles, registers, ceiling outlets, duct insulation, fire dampers, combination fire/smoke dampers, etc.
 - d. Acoustical treatment of ducts
 - e. Sound absorbing sections
 - f. Duct mounted heating coils
 - g. Fan powered terminal devices with and without heating coils
 - h. Variable air volume terminal devices with and without heating coils
 - i. Constant volume throttling devices
 - j. Dual duct constant volume terminal devices
10. Energy management and automatic temperature control systems (BCAS) consisting of all items indicated on the Drawings and/or specified herein, such as:
- a. Pneumatic control devices
 - b. Electric control devices
 - c. Electronic control devices
 - d. Computer control devices
 - e. Various relays
 - f. Valves, dampers, and sensors
 - g. Pneumatic piping, air compressors, air driers, etc.
 - h. Computer head-end equipment and communications network
 - i. Building Control and Automation System (BCAS)
 - j. Control system wiring
11. Ventilating systems consisting of all items indicated on the Drawings and/or specified herein, such as:
- a. Exhaust fans
 - b. Supply fans
 - c. Gravity ventilation hoods
 - d. Dampers, etc.
12. The mechanical subcontractors shall participate in and assist in the operation of the fire safety ventilation equipment as required during the performance testing and startup of the Division 28 fire detection, alarm and communication systems. Refer to Division 28 Section 28 31 00 titled "Fire Alarm and Communication Systems" for additional requirements.

1.3 WORK OF OTHER DIVISIONS

A. The following is a partial list of work not included in Division 23:

- 1. Electrical connections to motors.

2. Engine-driven generator exhaust silencers, flexible exhaust connectors, ventilated thimbles, and remote fuel storage day tank. Installations of exhaust silencers, flexible exhaust connections, ventilated thimbles, and remote fuel storage day tanks are included in the Work of this Division.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 23 05 10

HVAC WATER PIPING ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. General: Furnish and install HVAC water piping system accessories as specified herein and as shown on the Drawings.
- B. Types: Provide accessories of the following types:
 - 1. Thermometers
 - 2. Gauges
 - 3. Pressure/Temperature Test Plugs
 - 4. Valves
 - 5. Pressure Reducing Valves
 - 6. Suction Diffusers
 - 7. Strainers
 - 8. Pressure Relief Valves
 - 9. Balancing Kits
 - 10. Expansion Tanks
 - 11. Air Separators
 - 12. Air Vents
 - 13. Auxiliary Drain Pans and Drain Lines
 - 14. Venturi Flow Tubes
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Thermal Insulation - Section 20 07 00
 - 2. HVAC Water Piping - Section 23 21 13

PART 2 - PRODUCTS

2.1 THERMOMETERS

A. Furnish and install thermometers and thermometer wells for the following:

1. Entering chilled water at each chiller.
2. Leaving chilled water at each chiller.
3. Entering condenser water at each chiller.
4. Leaving condenser water at each chiller.
5. Entering hot water at each boiler.
6. Leaving hot water at each boiler.
7. Entering hot water at each heat exchanger.
8. Leaving hot water at each heat exchanger.
9. Chilled water supply main to the building riser.
10. Chilled water return main to the building riser.
11. Hot water supply main to the building riser.
12. Hot water return main to the building riser.
13. Chilled water supply to each air handling unit chilled water coil.
14. Chilled water return from each air handling unit chilled water coil.
15. Hot water supply to each air handling unit heating coil.
16. Hot water return from each air handling unit heating coil.
17. Where shown on the Drawings.

B. Thermometers shall be Moeller Instruments Company Style AJ, or approved equal, with a minimum 9" scale length and minimum 2°F scale divisions. Thermometers shall be adjustable angle, hinge assembly type with red or blue appearing triple distilled mercury column. Scale shall have white background with black scale, heat stamped, and permanently embossed. Case shall be extruded aluminum with powder-coated finish. Phenol or other plastics are unacceptable case materials. Lens shall be Plexiglas or double strength glass. Stems shall be aluminum with well connections. Bulb chamber shall be a rounded bevel union seat to provide maximum sensitivity. Temperature ranges shall be 0-100°F for chilled and condenser water, and 30-240°F for heating hot water.

C. Thermometer wells shall be brass or stainless steel with pressure and temperature ratings suitable for their application. Wells for insulated piping shall have a 2-1/2" lagging protrusion and all wells shall be filled with silicon and be provided with a cap and chain.

D. Thermometers and wells shall have the following insertion lengths:

PIPE DIAMETER	ORIENTATION	INSERTION LENGTH
4"	HORIZONTAL	2-1/2"
4", 6"	VERTICAL	5"
6", 8"	HORIZONTAL	5"
8", 10"	VERTICAL	8"
8"	HORIZONTAL	8"
10"	VERTICAL	14"

- E. Thermometers manufactured by Moeller Instrument Company, Trerice, or Weksler will be acceptable if they comply with these specifications.

2.2 GAUGES

- A. Furnish and install gauges for the following:
 - 1. Suction side of each pump inlet suction diffuser or strainer.
 - 2. Suction side of each pump.
 - 3. Discharge side of each pump.
 - 4. Entering water side of each chiller, boiler, and heat exchanger.
 - 5. Leaving water side of each chiller, boiler, and heat exchanger.
 - 6. Entering water side of each air handling unit hot water and chilled water coil.
 - 7. Leaving water side of each air handling unit hot water and chilled water coil.
 - 8. Where shown on the Drawings.
- B. Gauges shall be Moeller Instrument Company Vantage Series, or approved equal, with 4-1/2" dial face, 1/4" IPS connection, bourdon tube type, phosphor bronze soldered to brass socket and tip. Case shall be stainless steel with stainless steel ring. Pointer shall be adjustable. Movement shall be stainless steel or bronze bushed and gear operated. Accuracy shall be 1% of full scale over middle half of range. Window shall be glass. Dials shall be white with black markings, heat stamped, and permanently embossed. Provide Moeller or an approved equal needle valve, suitable for the pressure and temperature rating of the system.
- C. Pressure gauges installed outdoors shall be bourdon tube type, 316 stainless steel tube and socket. Cases to be 304, stainless steel, 4" minimum face, dry, glycerin or silicone filled. Pointer to be micrometer type adjustable. Movement shall be stainless steel. Accuracy shall be 1% of full scale. Window shall be glass. Gauge shall have a pressure relief plug.
- D. Differential pressure gauges for strainers shall be Orange Research Series 1201 with 0-5 psid range.
- E. Provide Trerice Series 870 or approved equal Moeller or Weksler impulse dampeners in-line between all gauge valves and pressure gauges. Provide Trerice Series 855 or approved equal Moeller or Weksler coil siphons between gauge valves and impulse dampers on all steam pressure gauges.
- F. Provide gauges with ranges and intervals appropriate to pressure conditions at the point of application.
- G. Gauges manufactured by Moeller Instrument Company, Trerice, or Weksler will be acceptable if they comply with these specifications.

2.3 PRESSURE/TEMPERATURE TEST PLUGS

- A. Provide pressure and temperature test plugs at the supply, bypass, and return connections to all coils (in addition to all other thermometers and wells specified) and as indicated on the Drawings. Test plugs shall be Peterson Engineering Pete's Plug, 1/2"

NPT, brass with Nordel core, Model 710. In addition, the Contractor shall supply the Owner with four pressure gauge adapters with 1/8" O.D. probe and four 5" stem pocket testing thermometers: Two 25-120°F, and two 0-220°F.

- B. If it complies with these Specifications, pressure temperature test plugs manufactured by Peterson Engineering, Sisco, MG Piping Products Company, or Texas Fairfax Company will be acceptable.

2.4 VALVES

- A. Ball and butterfly valves shall be used for isolation and throttling service on HVAC water systems. All valves shall be of non-blow-out construction. Where valves are installed in insulated piping, valves shall have stem extensions. All valves more than 8' above the floor shall be gear operated with chain operators.
 - B. Ball valves 2" and smaller shall be two- or three-piece body bronze (no more than 15% zinc), of a full port design. Stainless steel ball and stem. Valves shall be rated for 600 psi WOG and shall conform to MSS-SP-110. Ball valves installed in chilled water piping shall have insulating handles, such as NIBCO NIB-Seal. Valves to be:
 - 1. Nibco No. T-585-70-66
 - 2. Watts B6800 SS
 - C. Ball valves for copper piping up to and including 2-1/2" shall be two or three piece body bronze (no more than 15% zinc) of a full part design. Stainless steel ball and stem. Valves shall be rated for 600 psi WOG and shall conform to MSS-SP-110. NIBCO S-585-70-66 or equal by Watts.
 - D. Butterfly valves 2-1/2" and larger shall be ductile iron or cast iron lug body, molded-in EPDM (EPT) seat, aluminum bronze or stainless steel disc, 400 series stainless steel upper and lower stems (stems shall be positively connected to the valve disc), EPDM stem seals, lever operators on valves 5" and smaller, and gear operators with wheel for valves 6" and larger. Lever operators shall have memory stops and gear operators shall have waterproof, enclosed, factory worm gear operators with mechanical stops. All valves more than 8' above the floor (except where concealed above ceilings) shall be gear operated with chain operators. Butterfly valves shall be certified bubble-tight with bi-directional dead-end service without need of downstream flange and shall be listed by the manufacturer for continuous throttling service. Valves shall be:
 - 1. Nibco LD-2000 or GD 4765
 - 2. Watts (submit for approval)
- * Indicates type of valve operators (see above requirements).
- E. Butterfly valves for copper piping using grooved joint option shall have cast brass bodies, conforming to UNS C87850 with aluminum-bronze cast disc (UNSC95500) EPDM seat, EPDM seals, and 316 stainless steel trim. Valves shall be rated for working pressures up to 300 PSIG for bi-directional dead-end service. Handles and operators shall be as specified for ductile and cast iron butterfly valves. Valves shall be Victaulic Series 608N or approved equal.

- F. High Performance Butterfly Valves shall be ASTM-A216WCB steel lug body with reinforced PTFE garter spring type seal, blowout proof stainless steel stem, stainless steel disc, PTFE packing, and seal retaining ring. Valve shall be certified bubble-tight with bi-directional dead-end service without the need of downstream flange. Valves shall be Class 150 or Class 300 (ANSI B16.5), as per project requirements and shall meet MSS-SP-67 for double offset design. Valves smaller than 6" shall have lever handle, and valves 6" and larger shall have gear operators.

1. Class 150 Valves:

- a. NIBCO LCS6822
- b. Or Watts approved equal

2. Class 300 Valves:

- a. NIBCO LCS7822
- b. Or Watts approved equal

- G. Silent check valves shall be used on HVAC water systems. Silent check valves 2-1/2" and larger shall be non-slam globe type iron body, bronze disc with stainless steel seat and spring, full lug or flanged body style spring check valves with renewable seats and discs. Valves shall be ASA Class 125 rated, conforming to MSS-SP-125, and shall be:

- 1. Nibco F-910-B
- 2. NIBCO T/S-480Y
- 3. Watts (approved equal)

2.5 PRESSURE REDUCING VALVE

- A. The pressure reducing and pressure sustaining valve shall be installed where shown on the drawings. The valve is a single seated, hydraulically-operated, pilot-controlled, diaphragm type globe valve. Valve body shall be cast iron ASTM-A48, main valve trim shall be 303 stainless steel, pilot controls shall be bronze ASTM B-61, pilot control trim shall be 303 stainless steel. The valve shall have adjustment pressure ranges of 15 to 75 psi downstream and 0 to 75 psi upstream. The valve shall be ASA Class 125 rated and shall be:

- 1. Watts
- 2. Approved Equal

2.6 SUCTION DIFFUSERS

- A. Pump Suction Diffusers shall be Taco Series 300, Bell & Gossett, Armstrong, Aurora and Grundfos rated for 150 psi WOG and shall consist of an angle body with inlet vanes and a combination, 304 stainless steel diffuser strainer with 3/16" diameter openings. Flow direction shall be from inside the strainer to outside. The diffuser body shall fit the pump and connecting piping size and shall be provided with an adjustable support foot. Suction diffusers shall be factory drilled and tapped for field installation of a pressure gauge and gauge cock as shown on the drawings. A valve and cap shall be installed at the blowdown connection.

- B. A disposable fine mesh screen shall be installed in the strainer and shall be removed after the first 30 days of system operation. Strainers shall be cleaned after initial start-up, after 30 day of operation and at final acceptance.

2.7 STRAINERS

- A. Strainers shall be as manufactured by the Mueller Steam Specialty Company, Crane, Victaulic Style 732, McAlear, Zurn, or Keckley. Strainers for 2" and smaller piping shall be Mueller No. 11M, 400 #WOG, iron body with perforated 20 mesh, 304 stainless steel screen with cleanout and screwed ends. Strainers for piping 2-1/2" and larger shall be Mueller No. 758, 150 # WOG or Mueller No. 752, 500# WOG, with perforated 304 stainless steel screen with 1/16" perforations for sizes through 4" and 5/32" perforations for sizes 5" and larger, with blowdown connection and Class 125 ANSI B16.1 flanges ends. A valve and cap shall be installed at the blowdown connection. Where pump suction diffusers with integral strainers are provided, separate strainers shall not be required. Strainers shall be cleaned after initial start-up, after thirty (30) days of operation and at final acceptance.

2.8 PRESSURE RELIEF VALVES

- A. Relief Valves:
 - 1. Furnish and install relief valves where required and as indicated on the Drawings in all closed piping systems. Relief valve capacity shall be as required by the applicable code and as scheduled or as shown on the Drawings.
 - 2. Relief valves shall be suitable for the working pressure and temperature of the system in which they are installed. Refer to Section 23 05 02, Design Criteria.
 - 3. Inlet and outlet piping from the relief valve shall be at least the size of the valve connections unless otherwise indicated on the Drawings.
 - 4. Liquid relief valves shall be direct spring-loaded type with a cast iron, bronze or steel body and stainless steel or bronze trim, lifting lever, and ASME Unfired Pressure Vessel Code stamp. Valves shall be selected for a maximum overpressure of 10%.
 - 5. If they comply with these Specifications, relief valves manufactured by Kunkel, Watts, or Consolidated will be acceptable.

2.9 PRESSURE REDUCING VALVES

- A. Pressure Reducing Valves shall be Watts, Cla-Val, Wilkins, Victaulic/ Bermad or an approved equal. Watts No. U5LP for sizes to 2", No. 223S for 2-1/2" and 3" and No. 2300 for 4" and larger. Pressure reducing valves shall be provided for all system fill connections and shall be selected and set for 10 psi above system static head at the fill point.

2.10 MANUAL BALANCING KITS

- A. Pipe sizes 2" and smaller globe style: 300 psi, threaded or sweat ends, non-ferrous Ametal® brass copper alloy body, EPDM o-ring seals. 4 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting. Basis of Design Victaulic /TA Series 787 STAD or Series 786 STAS. Suitable for operating temperatures to 250°F.

- B. Pipe sizes 2-1/2" and larger globe style: grooved or flanged ends, ASTM A536 ductile iron body, all other metal parts of Ametal® brass copper alloy, EPDM O-ring seals. 8, 12 or 16 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting. Basis of Design: Victaulic/TA Hydronics Series 789 STAG or Series 788 STAF. Suitable for operating temperatures to 250°F.
- C. Koil-Kit™ Components: Install Victaulic Series 799 Koil Kit Components, Series 78U 400 psi forged DZR brass body with manual air vent port and pressure/temperature port, with EPDM seals. Series 78Y strainer/ball valve up to 400 psi Ametal® copper alloy body consisting of a full port ball valve and strainer with pressure and temperature measuring ports. Ball valve shall be complete with Teflon packing, plated ball, blow-out proof stem, handle extension and steel handle with vinyl grip. Strainer shall be Y-pattern, with 20 mesh stainless steel screen and blowdown port. 78T ball valve/union combination with handle extension. Body of valve to be made of DZR Brass. Series 78k balancing/shutoff valve 300 psi, threaded or sweat ends, non-ferrous Ametal® EPDM o-ring seals. 4 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting. Suitable for operating temperatures to 250°F.

2.11 EXPANSION TANKS

- A. Each closed loop pressurized water system shall include a diaphragm-type expansion tank with replaceable bladder. Each tank shall accommodate the expanded water of the system generated within the normal operating temperature range, limiting the pressure increase at all components in the system to the maximum allowable pressure at those components. It shall maintain minimum operating pressure necessary to eliminate all air. The only air in the system shall be the permanent sealed-in air cushion contained in the diaphragm-type tank. Tank size shall be as indicated on the Drawings.
- B. Each expansion tank shall be welded steel, construction tested and stamped in accordance with Section VIII of the ASME Code for a working pressure of 125 psi and pre-charged to the required minimum operating pressure. Prior to filling each tank, the tank shall be charged to a pressure approximately 5 psi above the system static pressure at the point of connection.
- C. If it complies with the Specifications, tanks manufactured by Amtrol, Armstrong, Taco, or Wood Industrial will be acceptable.

2.12 AIR SEPARATORS

- A. All free air originally contained in each closed water system, and all entrained air bubbles carried by system water shall be eliminated at all system points as indicated on the Drawings.
- B. The air separator shall be cast iron or welded steel, constructed, tested and stamped in accordance with Section VIII of the ASME Code for a working pressure or 125 psi.
- C. Size shall be as shown on the drawings or required.
- D. If it complies with the Specifications, air separators manufactured by Amtrol, Armstrong, Taco, or Wood Industrial will be acceptable.

2.13 AIR ELIMINATION VALVES (AIR VENTS)

- A. Air shall be eliminated to the atmosphere as fast as it is separated from system water, through float activated, remote pressure operated, automatic air elimination valves installed on top of an air separator, at the top of each riser, and at all other intermediate high points in closed piping systems.
- B. Air elimination valves shall be Sarco Type 13W, 150 psi WOG rated or an approved equal and shall be suitable for the system in which they are installed including the system pressure and temperature.
- C. Each air elimination valve shall have a high removal rate at low pressure differentials and shall be fully open for the removal of air at all pressures in the operating range from 2 to 150 psig. It shall be tightly sealed against loss of system water and prevent entrance of air in negative pressure situations. Each air elimination valve shall be constructed of metal and all working parts shall be non-corrosive.
- D. Provide 3/8" OD hard drawn Type L copper tubing from the vent outlet to a suitable drain. Provide 3/4" stop valve in vent line for air vent servicing.
- E. If they comply with these specifications, air elimination valves as manufactured by Sarco, Taco, or Woods Industrial will be acceptable.

2.14 AUXILIARY DRAIN PANS AND AUXILIARY DRAIN LINES

- A. Furnish and install 3" deep galvanized sheet metal auxiliary drain pans under any equipment where shown on the Drawings and under all horizontal air handling units, duct mounted chilled water coils, horizontal suspended fan coil units and suspended domestic water heaters located above ceilings.
- B. Drain pans shall be minimum 16-gauge galvanized steel with watertight soldered joints. Drain pans shall be at least 2" larger in each dimension than the equipment served and shall extend under control and isolation valves. Chain-suspend drain pans under equipment served. Pan shall have a welded coupling of the same size as the unit condensate drain (minimum 3/4" FPT). Pan bottom shall be cross-broken and sloped to the drain connection.
- C. Auxiliary drain lines shall be as specified hereinabove for drain piping but shall be uninsulated and shall be routed through the ceiling in "tell-tale" fashion above the nearest general use plumbing lavatory or janitors sink. An escutcheon shall be provided.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittals shall include, but not be limited to, the following:
 - 1. Cut sheets marked to clearly indicate all piping system materials to be used.
 - 2. Cut sheets clearly marked to show all HVAC piping accessories.

3. Valve samples as specified herein or requested.
4. Manufacturer's installation recommendations and instructions.

END OF SECTION

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SECTION 23 05 25

MISCELLANEOUS EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. Furnish and install miscellaneous equipment as shown on the Drawings, scheduled, and specified.

PART 2 - PRODUCTS

2.1 RANGE HOOD VENT CAP

- A. Furnish and install vent caps on all range hood exhaust ducts penetrating the roof as indicated on the drawings. Vents shall be Greenheck Model RDSP or approved equal. Roof vents shall be weather tight aluminum construction with integral bird screen.

2.2 WALL VENT CAPS

- A. Furnish and install wall vent caps from range hoods, penetrating exterior walls as indicated on the drawings. Vents shall be Broan Model 641 or approved equal. Wall vents shall be aluminum construction with bird screen and shall be field-painted by the General Contractor, as directed by the Architect.
- B. Furnish and install wall vent caps from dryer vents, penetrating exterior walls as indicated on the drawings. Vents shall be Broan Model 642 or approved equal. Wall vents shall be aluminum construction with bird screen and shall be field-painted by the General Contractor, as directed by the Architect.

2.3 BIRD SCREEN

- A. Square mesh hardware cloth (Bird Screen) shall be furnished and installed by the Mechanical Contractor at all air intakes and exhausts and elsewhere where shown or

required. Screens shall be galvanized steel #2 mesh, 19-gauge plain weave conforming to ANSI/ASTM A740-76. The minimum acceptable free area shall be 84%. Secure hemmed edge of hardware cloth to duct opening or louver with corrosion resistant bolts 8" on centers with minimum of three fasteners per side.

2.4 GRAVITY INTAKE AND RELIEF HOODS

- A. Furnish and install gravity hoods as shown on the drawings. Hoods shall be Greenheck WRH for relief and WIH for intake, or an approved equal. The hoods shall have a heavy-duty aluminum hood with rolled interlocking seams for reinforcement. A 1/2" x 1/2" galvanized bird screen shall be provided. Relief hoods shall be equipped with gravity backdraft dampers and removable cover for easy access. A heavy-duty 12" high insulated aluminum roof curb shall be provided.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittal shall include, but not be limited to, the following:
 - 1. Cut sheets on all miscellaneous equipment specified herein, clearly marked to show sizes, construction features, connection and installation details, capacities and other pertinent information.
 - 2. Additional information as required in Section 20 05 03.

3.2 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's written installation instructions, applicable standards, and recognized industry practices.
- B. Supports: Provide supports and miscellaneous steel members for equipment and be responsible for coordinating this Work and setting equipment in place. Roof curb and other components shall be designed to sustain the wind loading prescribed by the building code. Refer to Section 20 05 05 3.17 B for additional requirements.

END OF SECTION

SECTION 23 05 93

START-UP, TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. HVAC Testing, Adjusting, and Balancing - Section 01 45 23.01
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods - Section 20 05 05
 - 5. Scope of Work - Section 23 05 01

1.2 SCOPE

- A. Testing, adjusting, and balancing of all air systems.
- B. Testing, adjusting, and balancing of all hydronic (and steam) systems.
- C. Hydrostatic pressure testing of all pressure piping systems.
- D. Sound measurement of equipment operating conditions.

1.3 RELATED SECTIONS

- A. All Division 23 Sections.

1.4 QUALITY CONTROL

- 1. Refer to Specification Section 01 45 23.01.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

In addition to all items listed in Section 01 45 23.01, the contractor shall perform the following.

3.1 EXAMINATION

- A. Before commencing work, verify that systems are complete and operable to the following extent:
 - 1. Equipment is operable and in a safe and normal condition.

2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. All air filters are clean and in place. If required, install temporary media in addition to final filters.
5. Correct fan rotation.
6. Fire, smoke, and volume dampers are in place and open.
7. Coil fins have been cleaned and combed.
8. Access doors are closed, and duct end caps are in place.
9. Air outlets are installed and connected.
10. Duct system leakage is below specified level.
11. Hydronic systems have been flushed, filled, and vented.
12. Correct pump rotation.
13. Proper strainer baskets are clean and in place.
14. Service and balance valves are open.

- B. Report any defects or deficiencies noted during performance of services to Architect/Engineer.
- C. Promptly report abnormal conditions in mechanical systems or conditions that prevent system balance.
- D. If, for design reasons, system cannot be properly balanced, report as soon as observed.
- E. Beginning of work means acceptance of existing conditions.

3.2 PREPARATION

- A. Provide all material, equipment, and personnel, including factory personnel where specified or required, to fully check out and start up all equipment and systems as specified in accordance with manufacturer's requirements.
- B. No water piping systems shall be "pumped" until all piping has been hydrostatically tested, flushed, cleaned and water treated as applicable.
- C. Lubrication and fluid levels shall be checked prior to equipment start-up. Alignment on all motor driven equipment shall be checked and adjusted prior to start-up.

3.3 TESTING PROCEDURES

- A. Tests shall be made during the course of construction as specified and as required by authorities having jurisdiction.
- B. Test submittals shall include a preliminary submittal of all proposed test procedures and recording forms for Engineer's review prior to any testing and four (4) copies of all certified test results and completed reporting forms for approval.
- C. Gas Fired Boiler Safety Testing: Fire each gas-fired boiler make sure all safety devices are functioning properly. Run up temperature and pressure to relief valve settings and make them relieve pressure and shut off gas valve. Do not raise arm on relief valve for checking. Make sure all other safety devices for gas fired appliances and air conditioning equipment are functioning properly and fail safe.

- D. Vibration Testing: Where a piece of equipment exhibits, in the Engineers opinion, excessive noise or vibration, the service of a certified acoustic Consulting Engineer shall be provided to perform noise and vibration testing on the equipment or system involved. The Consulting Engineer shall provide a written report concerning the noise and vibration of the equipment or system involved and the Contractor involved shall make changes or modifications as recommended by the Consulting Engineer. The above services and retroactive corrections shall be provided at no cost to the Owner or Architect/Engineer.
- E. Hydrostatic Testing: All pressurized piping (not listed herein) shall be leak tested prior to enclosure or cover-up. Piping shall be leak tested for 24 hours under a hydrostatic pressure of 150% of the system design working pressure. The Engineer shall be notified prior to all hydrostatic tests and may elect to witness any of the tests. Water shall not be drawn off of the piping, and the piping shall not be covered up until it has been observed by the Engineer. Care shall be taken to protect any equipment that may be damaged by hydrostatic testing.
- F. Refrigerant Leak Testing: Leak test and check refrigerant systems at final acceptance and at the end of the warranty period. Repair any leaks found and properly charge affected systems with refrigerant. Ensure refrigerant systems are properly charged and free from leaks at final acceptance and at the end of warranty (1 year from final acceptance).
- G. Water Testing: Provide water analysis and testing as specified in Section 23 25 10.
- H. Fire, Smoke and Fire/Smoke Damper Testing: Provide fire, smoke and fire/smoke damper testing and certification as specified in Section 23 33 10.
- I. Fire Alarm System Interface: Provide testing, in conjunction with the Fire Alarm System functional testing specified in Section 28 31 00, to verify that all Fire alarm related HVAC control functions and shutdowns operated as specified in Section 23 09 16, Division 28, and as shown on the drawings.
- J. Duct Leakage: Medium pressure low velocity duct: Duct leakage shall be tested and shall be less than 2% of the duct system flow up to 4" W.G. maximum duct pressure. Ductwork failing this test shall be reworked, resealed, and retested by this Contractor until it passes this test.
- K. Air Balance: Upon completion of the installation of air system components, the outside, supply, exhaust and return air volume for each air handling unit, supply fan and exhaust fan; and the supply, exhaust or return air volume for each air distribution device shall be adjusted to within 5% of "design" air flow. The amount of air indicated on the drawings through ceiling outlets etc. includes a 5% allowance for duct leakage. "Design" air-flow is thus 95% of the value indicated on the drawings. Air handling unit and fan volumes shall be adjusted by changing fan speed and adjusting volume dampers associated with the unit.
- L. Air Distribution Device Volume shall be adjusted using the spin-in tap damper for flexible duct connected devices and/or the device OBD for duct connected devices. Air distribution devices shall be balanced with air patterns as specified. Duct volume

dampers shall be adjusted to provide air volume to branch ducts where such dampers are shown.

M. Water Balance:

1. After initial start-up of the chilled water, condenser, and heating hot water systems, each system shall be balanced to provide proper water volume from all pumps and through all loops, heat exchangers, coils, bypass links, and cooling tower cells to within 5% of the volume shown on the drawings.
2. The balanced position on all valves shall be permanently marked in the valve body insulation.

N. Automatic Temperature Control Adjustment: Adjust and calibrate all thermostats, dampers, operators, controllers, and other devices, as required to put the Temperature Control system in proper working order as designed and specified.

O. Completion Reports: Before the final inspection, but after all testing, balancing and adjusting, the Contractor shall furnish all labor, materials and devices necessary to prepare a completion report with the following information.

1. Motor data on all motors installed on the project. Motors shall be listed by the device on which they are installed, and information provided shall include:
 - a. Horsepower
 - b. Speed
 - c. Type
 - d. Location
 - e. Rated full load amperage
 - f. Rated voltage
 - g. Actual measured amperage for each leg
 - h. Actual measured voltage for each leg
2. Belt and drive data for all belt-driven equipment installed on the project. Data shall be listed by the device on which the belts and drive are installed, and information provided shall include: number of belts, size of belts, size and type of drive installed, motor RPM and driven device RPM.

P. IAQ Testing (LEED Projects): Provide IAQ Testing in accordance with USGBC requirements for the Indoor Air Quality Assessment Credit.

END OF SECTION

SECTION 23 21 13

HVAC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. Furnish and install a complete HVAC piping system as specified herein and as shown on the Drawings.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Pipe Heat Tracing - Section 20 05 33
 - 2. Noise and Vibration Isolation - Section 20 05 48
 - 3. Thermal Insulation - Section 20 07 00
 - 4. HVAC Water Piping Accessories - Section 23 05 10

1.3 QUALITY ASSURANCE

- A. Codes and Standards: All piping shall be manufactured in the United States of America by one of the manufacturers listed in the latest edition of the American Petroleum Institute (API) approved manufacturers listing.
- B. All grooved components including couplings, fittings, valves, gaskets, and specialties shall be of one manufacturer. All castings shall be dated stamped for quality assurance and traceability.

1.4 PIPE HEAT TRACING (FREEZE PROTECTION)

- A. The mechanical contractor shall furnish and install heat-tracing cable as specified in Section 20 05 33, where shown on the Drawings, and where piping is exposed to freezing conditions. The entire length of the exposed pipe including all valves, fittings, and accessories shall be traced and insulated. Refer to Section 20 07 00 for insulation requirements.

PART 2 - PRODUCTS

2.1 CHILLED, CONDENSER, AND HEATING HOT WATER PIPING (ABOVE GROUND)

- A. General: All chilled, condenser, and heating hot water piping above ground on the project shall be designed for 150 psig and shall be Schedule 40 in accordance with ANSI B36.10. Piping 4" and smaller shall be ASTM-A53 black steel. Piping 5" and larger shall be black steel ASTM A-53 seamless or electric resistance welded (fully normalized after welding).
- B. 2" and Smaller: Screwed fittings and flanges shall be used on pipe sizes up through 2" IPS. All screwed connections or fittings shall be accessible for repair and shall not be permitted in inaccessible locations. All taps shall be made using factory manufactured screwed fittings. Screwed fittings, where permitted shall be Class 150 ANSI B16.3 screwed malleable iron.
- C. 2-1/2" and Larger: All piping, 2-1/2" and larger, shall be butt-welded system in accordance with ANSI B31.1.0 except with flanges where required for service or equipment connections. All flanged or screwed connections shall be accessible for repair and shall not be permitted in inaccessible locations.
- D. Welded fittings shall be factory made wrought steel in accordance with ANSI B16.9 with wall thickness and material identical to pipe being fitted. Flanges shall be Class 150 ANSI B16.5 forged steel with beveled edge weld type neck. Branch piping taps more than one size smaller than the main shall be made with weldolets and/or threadolets manufactured in accordance with ANSI B16.9. All butt weld fittings shall have wall thickness as specified by ANSI B31.1.0 and ANSI B36.10 standards and they shall be suitable for the working pressure and temperature of the piping that they are installed in. No branch piping tap to the main shall be made by burning a hole in the main, inserting the end of the branch piping and then welding the branch piping to the main.
- E. Piping shall be installed in such a manner as to not obstruct the removal of filters, lubrication access to areas or general servicing of connected equipment. The routing of piping shall be placed so as to conserve as much space as possible in equipment rooms. Grade all piping, (1/16" per foot), to air vent locations. Bull-head tee connections and other piping connections which cause excessive pressure drop are not permitted. Reductions in line size for control valves shall not be made more than two pipe diameters away from the connections to the valve.
- F. Grooved Piping: At the Contractor's option, a UL listed grooved piping connection system with "cut-grooves" or "roll-grooves" may be used for piping 2-1/2" and larger above ground. Fittings for elbows, tees reducers, etc., shall be full flow fittings.
 - 1. QuickVic™ couplings for pipe prepared with the Victaulic Original Grooved System (OGS) groove profile, sizes 2" through 12" (DN50 through DN300), consisting of two ductile iron housing segments conforming to ASTM A536 Grade 65-45-12, orange coated or hot dipped galvanized as per ASTM A123, center-leg gasket, and ASTM A449 and A563 compliant zinc-electroplated carbon steel or ASTM F593 and F594 compliant stainless steel (with galling

reducing coating) bolts and nuts. Installation-Ready™, for direct stab installation without field disassembly.

- a. Rigid Type: Housings cast with torque-absorber and shift-limiting slant bolt pad design to provide piping system rigidity and support and hanging in accordance with ANSI B31.1 and B31.9, and to prevent mis-assembly due to over shift. Basis of Design: Victaulic Installation-Ready™ Style 107V.
 - 1) Housings cast with alignment indicator notch for visual proper alignment to adjoining fitting.
 - 2) Gaskets: Gaskets shall be verified as suitable for the intended service.
 - a) Grade EHP (EPDM) for water services, temperature range –30°F to +250°F/–34°C to +121°C.
 - b. Flexible Type: Use in locations where vibration attenuation and stress relief are required. Flexible couplings may be used in lieu of flexible connectors at equipment connections. Three couplings, for each connector, shall be placed in close proximity to the vibration source.
 - 1) 2" (DN50) through 8" (DN200): Victaulic Style 177 (Quick-Vic™). Installation ready flexible coupling for direct stab installation without field disassembly. Gasket shall be Grade "EHP" EPDM compound with red color code designed for operating temperatures from -30 deg F (-34 deg C) to +250 deg F (+120 deg C).
 - 2) 10" (DN250) through 12" (DN300): Victaulic Style 75 or 77 standard flexible couplings. Gasket shall be Grade "E" EPDM compound with green color code designed for operating temperatures from -30 deg F (-34 deg C) to +230 deg F (+110 deg C).
 - c. Pipe sizes 14" and larger: Use Victaulic AGS series with lead-in chamfer on housing key and wide width FlushSeal® gasket. Couplings shall be Victaulic Style W07 AGS Rigid Couplings with grade "EHP" gaskets in areas where piping system rigidity is required. Victaulic Style W77 AGS Flexible Couplings with grade "EHP" gaskets may be used in certain situations where vibration attenuation, stress relief, or accommodation of thermal expansion and contraction are required.
 - d. Taps to mains shall be made using Victaulic Style 72 outlet coupling or Style 920/920N mechanical tees or Victaulic Style 923/924 strapless outlets. Mechanical T couplings with U-bolts (i.e., Victaulic Style 921) shall not be permitted. Flange connections shall be made using Victaulic Style 741/743 flanges with grade "E" gaskets. Fittings for elbows, tees, reducers, etc., shall be Victaulic full flow fittings.
2. All proposed grooved or rolled piping connections materials shall be suitable for use at the temperatures and pressures encountered at the point of application. Painted couplings may be utilized in lieu of galvanized couplings.

3. Manufacturers: If they comply with these Specifications, only grooved piping products manufactured by Victaulic shall be allowed. No substitutions are acceptable.
4. Installation: The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).)

2.2 COPPER PIPING

- A. Copper pipe 2-1/2" and smaller may be used for chilled water and heating hot water Class 150 psig working pressure piping. Contractor shall coordinate valves and accessories where copper pipe is used, for proper connections. Steel pipe sizes are shown on the Drawings and shall be adjusted by the Contractor using the following pipe sizing conversion chart or as required to limit friction loss at scheduled GPM's to 5 ft./100 ft. Velocities shall not exceed 5 ft. per second in copper pipe.

GALVANIZED PIPE SIZE (IN)	COPPER PIPE SIZE (IN)
1/2	1/2
3/4	1
1	1-1/4
1-1/4	1-1/2
1-1/2	2
2	2-1/2

- B. Connections between steel and copper pipe shall be made with insulating unions or approved insulating couplings.
- C. Copper pipe shall be Cerro, Mueller, or approved equal Type L copper hard drawn ASTM B88-55, 1423.1.
- D. Fittings for copper pipe shall be domestically manufactured by Mueller, Nibco, or Elkhart for wrought copper joint fittings conforming to ASME B16.22 or ASME B16.18.
- E. All fittings shall either be soldered with Bridgit solder, using Bridgit burn resistant soldering flux (no exceptions), or press fittings (ProPress system) by Ridgid/Viega. Press fittings shall employ an EPDM o-ring seal and shall be pressed using the tool approved by the system manufacturer.
- F. Hangers shall be Fee & Mason, Figure 364 with Figure 227 adjustable, or approved equal.
- G. Refer to Section 23 05 10 for valves to be used in copper piping.
- H. Copper Option: Copper pipe type "L" hard drawn in sizes 2-1/2", 3", 4" and 6" for 150 psig systems may be used and assembled with Victaulic style 607 couplings. All fittings

shall be Victaulic style 600 series copper "no sweat" full flow with grooved ends manufactured to copper-tube dimensions. (Flaring of tube or fitting ends to accommodate alternate size couplings is not permitted.) Piping shall be roll grooved utilizing the grooving system manufacturer's roll-grooving machine. Couplings and fittings shall be of one manufacturer. Valves shall be as specified in Section 23 05 10. Flange adapters with lug-style butterfly valves will not be allowed.

- I. Plain End Carbon Steel Option: If the capability of the Subcontractor is demonstrated to the Engineer, at the Subcontractor's option, plain-end carbon steel piping 2" and smaller for 150 and 300 psig working pressures may be joined by the Victaulic® QuickVic™ SD Installation-Ready™ System. Pipe to be as specified above for Carbon Steel Pipe herein.
 1. For Fittings and Couplings: Ductile iron conforming to ASTM A536, Grade 65-45-12. Gasket shall be Victaulic Grade "EHP" EPDM suitable for water service temperature range -30°F to +250°F.
 2. Tool: PC3110 Cut & Mark Tool designed to cut and mark (knurled marks to clearly display the insertion depth on the outside of the pipe for proper coupling/fitting installation) the pipe simultaneously. Tool to be supplied by Victaulic. If a PC3110 Cut & Mark tool is not used, insertion depth witness marks shall be applied and visible on every joint to ensure correct insertion depth installation.

2.3 CHILLED AND HEATING HOT WATER PIPING (UNDERGROUND)

- A. General: All chilled and heating hot water piping underground shall be a pre-insulated and pre-fabricated double wall piping system sized as shown on the Drawings.
- B. Carrier Pipe: Black steel, standard weight, 150 psig working pressure class carrier pipe in accordance with ANSI B36.10. Piping 4" and smaller shall be ASTM A-53 black steel. Piping 5" and larger shall be black steel ASTM A-53 seamless or electric resistance welded (fully normalized after welding). All piping shall be a butt-welded system in accordance with ANSI B31.1.0.
- C. Insulation: The piping system shall be insulated with closed cell polyurethane foam insulation completely filling the annular space between the carrier pipe and outer jacket. Jacket ends shall be protected with factory applied moisture barrier. Insulation shall be minimum thickness 1-1/2" rigid, 90-95% closed cell polyurethane with a 2.5 to 3.5 pounds per cubic foot density and a coefficient of thermal conductivity (K factor) of 0.14 at 50°F or 0.17 at 75°F and conform to HH-I1751/4.
- D. Outer Jacket: Outer Jacket material shall be one of the following types with minimum thicknesses as scheduled herein. Jacketing must comply with H-20 Highway loading specifications.
 1. Extruded polyvinyl chloride, consisting of clean, virgin NDF approved Class 12454-B PVC compound, conforming to ASTM D1784, Type I, Grade I - Minimum 70 mils.
 2. Seamless, high density, polyethylene (HDPE) - Minimum 100 mils.
 3. Filament-wound polyester resin with fiberglass reinforcement applied directly on the foam insulation (Fiberglass) - Minimum 120 mils.

4. Reinforced thermosetting resin pipe (RTRP), continuous strands impregnated with polyester corrosion resistant resins, filament wound - Minimum 120 mils.
- E. End Seal: Insulation at each end of each length of pipe shall be protected with an end seal bonded both to the carrier pipe and the outer jacket. Piping cuts made in the field must be provided with end-seals equal to factory type. Testing and certification procedures shall demonstrate the casing and end seals are capable of resisting penetration of water into the casing and insulation at 12 feet of head pressure, measured above the highest point of the test sample, subjected over the entire surface of an 8-foot casing test sample for not less than 48 hours, after the sample has been subjected to hot and cold cycle testing.
- F. Joints/Elbows: All elbows, tees, couplings, shall be pre-fabricated and insulated by manufacturer. Insulation and vapor barrier shall be installed over welded areas in accordance with manufacturer's published data and shall be of the same material and thickness as the adjacent straight section. Mitered seams on elbow outer jackets shall be bonded watertight. The ends of joint sleeves and elbow fittings shall be sealed with heat shrink sleeves or wrappings of glass reinforcement fully saturated with a catalyzed resin identical to the factory applied resin. Joint and elbow jacket thickness shall be same as for straight pipe sections.
- G. Electronic Safety Alarm System: Provide an electronic safety alarm system for detecting and locating leaks into the insulation system. Detection conductors in sufficient quantity for the pipe size used shall be embedded in the insulation and shall be continuous. The alarm system shall operate on 120-volt, 60 Hz power and be capable of determining the location at which water appears in the insulation. It shall be of solid-state construction, in a UL listed enclosure, protected from transient electrical current, and capable of operation in an environment of 32°F-128°F. The central control panel shall be located in the mechanical room where shown on the Drawings. Provide a set of normally open dry contacts that, upon closure, shall send a common alarm signal to the Building Control and Automation System (BCAS).
- H. Manufacturers: If it complies with these Specifications, pre-insulated/pre-fabricated piping systems, for underground use, as manufactured by Rovanco, Perma-Pipe, or Insul-Pipe will be acceptable.

2.4 CONDENSER WATER PIPING (UNDERGROUND)

- A. All condenser water piping below ground shall be bell and spigot type and shall be designed for 100 psig and shall be Class 100 in accordance with AWWA C900 requirements for Poly Vinyl Chloride (PVC) pressure pipe.
- B. All pipe shall be suitable for use as a pressure conduit. Provisions shall be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring that meets the requirements of ASTM D-1869 and E-477. The bell section shall be designed to be at least as strong as the pipe wall. Standard laying lengths shall be 21 feet. Each length of pipe shall be tested to four times the class pressure of the pipe for a minimum of 5 seconds. The integral bell shall be tested with the pipe.

- C. All steel piping adjoining this system shall be anchored at or near the point of connection. Connection between PVC and steel pipe shall be made by inserting pipe into PVC end or with a flexible expansion coupling as recommended by the manufacturer. The Contractor shall pour concrete thrust blocks, prior to testing pipe, at every change of direction. The block size shall be in accordance with normal water line installation for the existing soil conditions in accordance with the manufacturer's recommendations.
- D. All required calculations for the sizing and placement of concrete thrust blocks, at all changes in direction shall be provided by the piping manufacturer. Soil loading information shall be provided by the Structural Engineer, for the Mechanical Contractor to forward to the manufacturer. The Mechanical Contractor shall submit thrust block sizing calculations for review by the Engineer prior to installation of below grade pipe. Calculations shall include thrust in pounds, bearing area of thrust block in square feet and direction of thrust. General Contractor shall furnish and install all required concrete formwork and shall pour all concrete for thrust blocks.
- E. Pipe shall be Johns-Manville DR-25, "Blue Brute," or approved equal.

2.5 HDPE CHILLED AND CONDENSER WATER PIPING HDPE OPTION
(UNDERGROUND)

- A. At the contractor's option with written approval from the engineer, High Density Polyethylene (HDPE) pipe in compliance with the requirements of ASTM D1248, ASTM 3350, AWWA C901 (2" through 3"). AWWA C906 (4" through 63"), and NSF Standards 14 and 61 rated for 150 psig (chilled) or 100 psig (condenser) may be used. The HDPE system shall be mechanically-joined using Victaulic couplings and valves.
 - 1. Plain-End Style 905 Coupling for HDPE Pipe for sizes 2" to 14" as manufactured by Victaulic Company; consisting of two ductile iron housings conforming to ASTM A 536, Grade 65-45-12 designed for full installation at pad-to-pad contact. Couplings shall include a Type 301 stainless steel retaining ring teeth to engage the pipe OD and permit installation without fusing equipment. Couplings shall be provided with heat-treated, zinc-electroplated with fluoropolymer topcoat carbon steel bolts/nuts, meeting the physical and chemical requirements of ASTM A-449 and physical requirements of A-183, with hardened steel washers to ASTM F436, with pre-lubricated Grade 'E' EPDM gaskets and working pressures equal to the adjoining HDPE pipe.
 - 2. Couplings shall be fully installed at visual metal-to-metal contact. (Couplings do not require 'gapping' of bolt pads and/or specific torque ratings.)
 - 3. Refer to the Victaulic IT-905 Installation Instructions.
 - 4. Style 907/W907 Transition Coupling for HDPE to Steel Pipe for sizes 2" to 14" as manufactured by Victaulic Company; meeting the same specification standards as the Style 905, shall be used for transitions from plain-end HDPE to grooved pipe or grooved Victaulic 761 butterfly valves.
 - 5. Style 908 Double-Groove Coupling for HDPE Pipe for sizes 16" through 36", as manufactured by Victaulic Company; double-bolted coupling to engage double-grooved HDPE pipe conforming to PE100, PE4710 / ASTM D3035 or ASTM F714, and PE100 / ISO 4427, consisting of two ductile iron housings conforming to ASTM A 536, Grade 65-45-12 with two keys designed for use with AGS style wedge shaped grooves. Zinc-electroplated with fluoropolymer topcoat carbon

steel bolts, meeting the physical and chemical requirements of ASTM A-449 and physical requirements of A-183, and carbon steel heavy hex nuts meeting the physical and chemical requirements of ASTM A-563 Grade B. Complete with Grade 'E' EPDM gasket. Working pressures equal to the adjoining HDPE pipe.

- a. Style 908 is for use on HDPE pipe with grooved ends that are prepared with Victaulic pipe end preparation equipment.
6. Refer to the Victaulic I-908 Installation Instructions. All joints must be inspected and reviewed for proper installation prior to pressure testing and bury.

PART 3 - EXECUTION

3.1 SUBMITTAL

- A. Shop drawing submittal shall include, but not be limited to, the following:
 1. Cut sheets marked to clearly indicate all HVAC piping system materials to be used.
 2. Piping fabrication drawings shall be submitted for all piping in the Central Plant, Mechanical Rooms, and for Equipment connections in all other areas. Pipe fabrication drawings shall be double line drawings to scale on 1/4" scale building floor plans and shall indicate pipe size, fittings, valves, accessories, connections, system type, insulation, support requirements, isolator locations and types, pipe elevations and other information required for coordination with other trades and fabrication of piping.
 3. Pipe fabrication drawings for all underground piping showing location and sizes of all expansion/contraction loops, thrust block location, anchors and guides.
 4. Manufacturer's installation recommendations and instructions.
- B. Grooved products shall be shown on drawings and product submittals and shall be specifically identified with the applicable style or series number.

3.2 PRE-INSULATED UNDERGROUND PIPE INSTALLATION

- A. Installation: Welded joints of the carrier pipe shall be painted prior to application of insulation to the joints. The system manufacturer shall perform a complete stress analysis on the system to determine anticipated thermal movement in the carrier pipe and to determine required anchorage, etc. Provide anchors as required by the stress analysis. Factory trained field supervision shall be provided for critical periods of installation such as unloading, field joint instruction, testing, alarm system checkout, and backfilling. The system shall be temperature adjusted during installation if required or recommended by the manufacturer. Carrier pipe shall be tested to 1-1/2 times the system design working pressure. The entire installation shall be in strict accordance with the manufacturer's instructions and recommendations.

3.3 PIPING IDENTIFICATION

- A. All exposed piping interior and exterior shall be painted. Interior color shall be according to the adopted color codes and shall be appropriately labeled at intervals in specified

height letters. Piping exposed to view shall be painted to comply to color scheme.
Piping on roof/exterior shall be painted with epoxy or polyurethane industrial coating.

- B. Piping in central plant mechanical yard shall be epoxy painted or polyurethane industrial coating applied in the appropriate color below. Insulated pipe will have the insulation jacket painted and non-insulated pipe shall be properly prepared and painted.
- C. Provide a framed copy of the chart below in the central plant for maintenance personnel reference.

System	Color
Chilled water from chiller	Dark Blue (SW-4056)
Chilled water to chiller	Light Blue (SW-4054)
Hot water from boiler	Dark Red (SW-6871)
Hot water to boiler	Light Red (SW-6858)
Condenser water from tower	Light Green (SW-4069)
Condenser water to tower	Dark Green (SW-4071)
Natural Gas Piping	Safety Yellow (SW-4084)

END OF SECTION

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SECTION 23 21 23

HVAC PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. Furnish and install HVAC pumps as shown, scheduled, and specified including, but not limited to:
 - 1. Horizontal split case centrifugal pumps.
 - 2. Horizontal end suction centrifugal pumps.
 - 3. In-line centrifugal pumps.
 - 4. Split-coupled vertical in-line centrifugal pumps (VIL)
 - 5. Duplex condensate return units
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Motors and Controllers - Section 20 05 13
 - 2. Electronic Variable Speed Drives - Section 20 05 14
 - 3. Noise and Vibration Isolation - Section 20 05 48
 - 4. Thermal Insulation - Section 20 07 00

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Pumps:
 - a. Armstrong
 - b. Aurora Pump Company
 - c. Bell and Gossett
 - d. Grundfos

e. Taco

- B. General Construction: The entire pump assembly including suction flange shall be suitable for operation with the maximum working pressures and temperatures scheduled on the Drawings.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL PUMPS

- A. General: Furnish and install horizontal base mounted, flexible coupled, bronze fitted centrifugal type, mechanical seal pumps of the size, capacity, and head scheduled on the Drawings. The selected pump operation point shall have a minimum efficiency as scheduled and impeller diameter shall not exceed 85% of the cutwater diameter for the selected pump casing size. All pumps shall have dynamically balanced impellers. Shutoff head shall be at least 110% of design head but shall not exceed 140% of design head, unless scheduled otherwise.
- B. Pumps: Pumps, casings, flanges and seals shall be suitable for operation at 150 psig minimum and shall be suitable for use within the normal temperature operating ranges of the system in which they are installed. Pumps shall have carbon steel shafts, stainless steel sleeves, cast-iron or bronze casing wear rings, bronze impeller wear rings, external seal water piping, cast-iron deflectors, stainless steel impeller keys, coated fiber packing gaskets and steel casing studs and bolts.
- C. Couplings and Alignment: Pump couplings shall be Woods Type SC Sure-Flex flexible couplings, or an approved equal. Coupling alignment shall be field calibrated to a maximum of 2 mils vibration. Provide factory manufactured coupling guard meeting OSHA standards with each pump.
- D. Impellers:
1. All pumps shall have dynamically balanced impellers and those with motors 10 HP or greater shall be factory capacity tested after final assembly. Certified factory pump performance test curves shall be submitted indicating capacity, head, horsepower and efficiency from shutoff to 125% of design flow.
 2. The impeller selected shall not exceed 85% of the cutwater diameter for the pump casing size. This shall be clearly certified on the pump submittal.
- E. Seals: All pumps shall be equipped with mechanical seals manufactured by John Crane Company or approved equal and suitable for the service intended.
1. For working pressures less than or equal to 150 psig, Type 1 or 2 seals shall be furnished.
 2. For working pressures greater than 150 psig, Type 1B or 2B pressure balanced seals shall be furnished.
 3. Seal material for pumps handling treated fluids up to 180°F shall be Type BP (66)1D1.
 4. Seal material for pumps handling treated fluids greater than 180°F shall be Type XP (66)1D1.

- F. Seal Protection: The mechanical seals on all condenser water pumps shall be provided with a Dorr-Oliver Type P "Doxie" impurity eliminator constructed throughout with Nylon. Piping shall be copper or Schedule 40 galvanized steel and shall be provided with isolation gate valves and valved bypass piping as recommended by the impurity eliminator manufacturer or as shown on the Drawings.
- G. Bearings: All pumps shall have grease-lubricated ball bearings with grease fittings and relief plugs. Bearings shall have 400,000 hours minimum life for suction pressures below 200 psi and 200,000 hours minimum life for suction pressures 200 psi and above. Bearings shall limit impeller and mechanical seal face deflection to a maximum of 0.002 inches.
- H. Base: Each pump shall have a drip lip type (except outdoor units) cast iron or steel base. The base shall have provisions for grouting, anchor bolts, and collection of all seal leakage. The base shall have machined surfaces for the mounting of pump casing and motor. Motor mounting shall permit horizontal movement. A 3/4" threaded outlet shall be provided in the base at the pump end for field piping of drainage to the nearest floor drain. The base shall be sufficient strength to prevent vibration, warping or misalignment of the pump and motor when installed without grouting. The base shall be rigidly bolted to the vibration isolation base. After final alignment, all pumps with 25 HP or larger motors shall have the pump and motor doweled to the base.
- I. Motors: Pump motors shall be Energy Efficient 1750 RPM open drip-proof type (indoors) or TEFC (outdoors) and shall be selected to drive the pump through its characteristic curve from zero flow to 125% of design flow without exceeding rated full load nameplate horsepower. Refer to Section 20 05 13 for additional motor requirements and minimum efficiencies.
- J. Miscellaneous:
1. Pumps shall be free of flashing and cavitation at all flow rates from 25% to 125% of design flow under the suction conditions of the pump installation.
 2. Critical speed of each pump shall be at least 115% of the running speed scheduled.
 3. Each motor shall have a maximum speed of 1750 RPM and shall be selected to drive the pump through its characteristic curve, from zero flow to 125% of design flow without exceeding rated nameplate horsepower.
- K. Factory Tests: Pumps with drive motors 20 horsepower and larger shall be individually factory capacity tested after final assembly. Provide certified copies of test results showing capacity, head, horsepower, and efficiency at flow rates from shut off to 125% of design flow. The certification shall also indicate results of factory dynamic balance and pressure testing. Provide certified performance curves for pumps less than 20 horsepower.

2.2 SPLIT-COUPLED VERTICAL IN-LINE CENTRIFUGAL (VIL) PUMPS

- A. General: Furnish and install vertical in-line, single-stage, single or double suction, split coupled, bronze fitted centrifugal type, mechanical seal pumps of the size, capacity and head scheduled on the Drawings. The selected pump operation point shall have a

minimum efficiency as scheduled and impeller diameter shall not exceed 85% of the cutwater diameter for the selected pump casing size. All pumps shall have dynamically balanced impellers. Shutoff head shall be at least 110 percent of design head but shall not exceed 140 percent of design head, unless scheduled otherwise. Provide Armstrong Series 4300 (or approved equal) split-coupled Type VIL units, with rigid spacer type coupling.

- B. Pumps: Pumps, casings, flanges and seals shall be suitable for operation at 150 psig minimum, and shall be suitable for use within the normal temperature operating ranges of the system in which they are installed. Pumps shall have stainless steel shafts, stainless steel sleeves, cast-iron, or bronze casing wear rings, bronze impeller wear rings, external seal water piping, cast-iron deflectors, stainless steel impeller keys, coated fiber packing gaskets and steel casing studs and bolts.
- C. Couplings and Alignment: Pump couplings shall be rigid, axially split type which permit replacement of seals and bearings without disturbing motor-pump alignment. Coupling alignment shall be field calibrated to a maximum of 2 mils vibration. Provide factory manufactured coupling guard meeting OSHA standards with each pump.
- D. Impellers:
1. All pumps shall have dynamically balanced impellers and those with motors 10 HP or greater shall be factory capacity tested after final assembly. Certified factory pump performance test curves shall be submitted indicating capacity, head, horsepower and efficiency from shutoff to 125% of design flow.
 2. The impeller selected shall not exceed 85% of the cutwater diameter for the pump casing size. This shall be clearly certified on the pump submittal.
- E. Seals: All pumps shall be equipped with mechanical seals manufactured by John Crane Company or approved equal and suitable for the service intended.
1. For working pressures less than or equal to 150 psig, Type 1 or 2 seals shall be furnished.
 2. For working pressures greater than 150 psig, Type 1B or 2B pressure balanced seals shall be furnished.
 3. Seal material for pumps handling treated fluids up to 180°F shall be Type BP (66)1D1.
 4. Seal material for pumps handling treated fluids greater than 180°F shall be Type XP (66)1D1.
 5. All split coupled pumps shall be provided with a lower seal chamber throttle bushing to ensure seals maintain positively cooling and lubrication.
- F. Bearings: All pumps shall have grease-lubricated ball bearings with grease fittings and relief plugs. Bearings shall have 400,000 hours minimum life for suction pressures below 200 psi and 200,000 hours minimum life for suction pressures 200 psi and above. Bearings shall limit impeller and mechanical seal face deflection to a maximum of 0.002 inches.
- G. Motors: Pump motors shall be Energy Efficient 1750 RPM open drip-proof type (indoors) or TEFC (outdoors), and shall be selected to drive the pump through its characteristic curve from zero flow to 125% of design flow without exceeding rated full

load nameplate horsepower. Refer to Section 20 05 13 for additional motor requirements and minimum efficiencies. Motors shall be mounted to pump with a cast iron cylindrical bracket. The bracket shall permit servicing or replacing seals and bearings without removing the motor. The bracket shall have bolted flanged connections to the pump and motor and shall be factory aligned. The pump and motor shall be supported by the piping system. Piping sections directly adjacent to the suction and discharge connections shall be supported directly from the structure above using vibration isolation hangers. The hangers shall be selected to support the weight of the pump and motor assembly as well as the piping system. Install a lifting lug in the structure directly above the pump to facilitate removal of the motor. Provide and install steel as necessary to position lifting lug above pump if structural members are not located where needed.

H. Miscellaneous:

1. Pumps shall be free of flashing and cavitation at all flow rates from 25% to 125% of design flow under the suction conditions of the pump installation.
2. Critical speed of each pump shall be at least 115% of the running speed scheduled.
3. Each motor shall have a maximum speed of 1750 RPM and shall be selected to drive the pump through its characteristic curve, from zero flow to 125% of design flow without exceeding rated nameplate horsepower.

- I. Factory Tests: Pumps with drive motors 20 horsepower and larger shall be individually factory capacity tested after final assembly. Provide copies of test results showing capacity, head, horsepower, and efficiency at flow rates from shut off to 125% of design flow. The submittal shall also indicate results of factory dynamic balance and pressure testing.

2.3 IN-LINE CENTRIFUGAL PUMPS

- A. General: Provide circulating pumps with bronze fitted construction of the size, type, and capacity scheduled or shown on the Drawings. Pumps shall be fitted with a dynamically balanced brass enclosed type impeller with mechanical seal. Mechanical seal shall be Type 1 or Type 2 material, Code BP-1D1 as manufactured by John Crane Company or an approved equal, suitable for service specified. Motor shall have a maximum speed of 1750 rpm. Pumps, casings, flanges, and seals shall be suitable for operation with the working pressure and temperatures indicated. The scheduled working pressure applies to the entire pump assembly.

2.4 DUPLEX CONDENSATE RETURN UNITS

- A. General: Furnish and install duplex condensate return units as shown and scheduled.
- B. Each unit shall consist of a vented receiver with all necessary openings, duplex pumps, supporting frame and legs, and control panel. The receiver shall be designed for steam condensate duty. The interior shall be protected against corrosion. Furnish a removable electrolyte to prevent electrolytic corrosion.
- C. Pumps shall be designed to handle 212°F condensate in the capacities listed, without flashing. Pumps shall have 220°F mechanical seals.

- D. Motor shall not be overloaded under any condition of operation. Refer to Section 20 05 13 for additional motor requirements.
- E. Provide check valves located in the discharge of each pump. Pump drive and receiver shall be mounted on a base designed for this arrangement. Base shall be designed for installation on spring isolators. See Section 20 05 48, Noise and Vibration Isolation.
- F. Furnish a NEMA 1 enclosed control panel. This panel shall include but not be limited to the following:
 - 1. Fused disconnect for each motor.
 - 2. Motor controller for each motor. See Section 20 05 13 for additional requirements.
 - 3. Level controls.
 - 4. Control voltage transformer if required.
 - 5. Automatic alternator.
 - 6. Pressure gauges on pump discharges.
 - 7. Hand-Off-Automatic switches.
 - 8. Safety disconnect door.
- G. The receiver shall include displacement type level controls and 1/2" gauge glass with ground rods.
- H. Each unit shall be tested at the factory before shipment and the manufacturer shall certify the test results.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittals shall include the following:
 - 1. Pump cut sheets with all pump capacities, characteristics, features, accessories and options clearly indicated.
 - 2. Pump pressure/flow curves with selection point clearly indicated.
 - 3. Motor data as required in Section 20 05 13.

3.2 INSTALLATION

- A. Pipe, install and insulate HVAC pumps as shown on the Drawings. All base mounted pumps shall be mounted on a housekeeping pad as specified in Section 20 05 05 with vibration isolation as specified in Section 20 05 48. After pump installation is complete, field check alignment and dowel all pumps and motors on pumps 25 horsepower and larger to the base. Grout all pump bases in place.
- B. After pumps have been in operation for 90 days, the contractor shall check all seals and replace any which are defective.

END OF SECTION

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SECTION 23 31 13

DUCTWORK AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. General: Furnish and install all round and rectangular ductwork, flexible duct, hangers, supports, sleeves, flashings, vent flues and all necessary accessories as shown on the Drawings and as specified herein.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Thermal Insulation - Section 20 07 00
 - 2. Air Distribution Devices and Dampers - Section 23 33 10
 - 3. Sound Attenuators - Section 23 33 19
 - 4. Air Terminal Units - Section 23 36 00
 - 5. Air Filtering - Section 23 41 10

1.3 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Ductwork shall be constructed in accordance with construction requirements specified in the 2005 SMACNA Edition 3 of "HVAC Duct Construction Standards", except where SMACNA requirements are exceeded in these specifications.
 - 2. Kitchen hood and dishwasher hood exhaust ductwork - NFPA 96.
 - 3. Laboratory hood and chemical fume exhaust ductwork - NFPA 45.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. System Class:

1. All Ductwork upstream of air terminal units shall be constructed for static pressure class based on scheduled external static pressure from applicable air handling unit schedule. Material shall be 2500 FPM Class galvanized steel of "lock forming" quality unless otherwise noted.
2. All ductwork downstream of air terminal units, Multizone supply ductwork, and single zone air handling unit supply ductwork shall be built to +1" W.G., 2500 FPM Class Standards, unless noted otherwise on fan schedule. All +1" Class ductwork shall be constructed of "lock forming quality" galvanized sheet metal with a minimum gauge not less than that shown in SMACNA Standards.
3. All return and exhaust ductwork shall be built to -2" W.G., 2500 FPM Class Standards, unless noted otherwise on fan schedule.

2.2 GENERAL CONSTRUCTION

- A. All ductwork shall be constructed of G60 coated galvanized steel of ASTM Standards A653 and A924 grades.
- B. Minimum gauge of any ductwork, round or rectangular, shall be 26 gauge.
- C. The interior surface of all ductwork shall be smooth with no sheet metal or other parts projecting into the air stream. All seams and joints shall be external. The inside of all ductwork shall be thoroughly cleaned, and all fans operated to remove any debris prior to connection of air distribution devices.
- D. All ductwork dimensions on the Drawings are clear inside dimensions. Refer to Section 20 07 00 for ductwork liner and insulation.
- E. All flexible round take-offs to Air Distribution Devices shall be made with a spin-collar with integral manual volume damper. Spin-ins shall be installed with their damper axis parallel to air flow.
- F. Ductwork Leakage: Maximum allowable ductwork leakage, as a percentage of air system volume, shall be 2%.
- G. Ductwork Sealing:
 1. All transverse duct joints, longitudinal seams and duct wall penetrations shall be sealed regardless of duct pressure classification.
 2. Sealer shall be rated by manufacturer and shall be suitable for use at the system static pressure classification of the ductwork applied.
 3. Ductwork sealant shall be Hardcast "Versa-Grip 181" or approved equal. Sealant shall be suitable for use indoors and outdoors. Sealant shall be water based. Sealant shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less. Sealant shall be listed in accordance with UL 181A or UL 181B, as required in the International Energy Conservation Code.

4. Duct sealant shall be applied per manufacturer's instructions. Minimum drying time shall be allowed per manufacturer's instructions. Additional time for drying shall be allowed in climates where temperature and humidity may affect the curing of the sealant. Sealant shall be allowed to completely dry and harden before air is circulated through the ductwork.
5. The use of duct tape for sealing of metal ducts is prohibited unless the tape is part of, and used, in conjunction with a multi-part sealing system (i.e., adhesive, tape, coating, etc.).

2.3 RECTANGULAR DUCTWORK

- A. Transverse Bead: Transverse bead all flat surfaces which are more than 12" wide. Transverse beading shall be on 12" centers and shall be minimum of 1/8" deep at the center of the bead and 3/8" wide at the base of the bead. Do Not cross-break negative pressure ductwork.
- B. Longitudinal Seams: All longitudinal seams shall be "Pittsburgh Lock" or Button Punch Snap Lock at corner seams and Grooved (ACME) Seam or Seam Welded in sides between corners.
- C. Transverse Joints: All transverse joints and intermediate reinforcement shall be as shown in SMACNA Tables 1-4 through 1-9, and Figure 1-4 with Drive Slip connections (reinforced or un-reinforced as required) on the short sides and hemmed "S" slip connections (reinforced or un-reinforced as required) on the long sides. "S" and drive connectors are acceptable for use on ducts with pressure classification of ± 1 " w.g. (maximum). At the Contractor's option, transverse joints may be transverse duct connectors by one of the following manufacturers. The proposed gasket material, flange, corner piece, and connection details shall be submitted for review.
 1. Transverse Duct Flange (TDF or TDC)
 2. Ductmate EP12/11 prefabricated galvanized "Ductmate" sections
 3. MEZ Industries 140 Series transverse duct connectors
 4. Exanno (Nexus)
 5. Ward Industries, Inc.
- D. Plenums: Sheet metal plenums shall be constructed and reinforced in accordance with SMACNA Standards. Where plenums are connected to louvers, the Plenum bottom shall be watertight, sloped and sealed to drain water to the outside face of the building through the face of the louver.
- E. Support: All ductwork supports shall be per Table 4-1 of the SMACNA manual with all supports directly anchored to the building structure. Supports shall be on maximum 8'-0" centers with additional supports as required to prevent sagging.
- F. Fabric Connections: Flexible duct fabric connections shall be installed on the inlet and outlet connections to all powered air moving equipment not connected with flexible duct attached directly to inlet or discharge plenum. A minimum of 1" of slack shall be allowed in all flexible connections to ensure vibration isolation. Flexible fabric shall be a minimum of 3 inches wide with "Grip-Loc" seam to 24-gauge galvanized metal side connectors a minimum of 3 inches wide each. Flexible connections are to be fabricated with Duro Dyne Excelon "Metal-Fab" vinyl coated 22 oz. nylon with 24-gauge galvanized

iron side connectors or "approved equal". Provide UV rated connections where exposed to sunlight.

- G. Splitter Dampers: Install manual splitter dampers in splits and branch take-offs in all constant volume air flow systems, and where shown on Drawings. Splitter dampers shall be minimum 16-gauge galvanized sheet metal and shall be 3/4 of the width of the smallest take-off but no less than 6" long. Dampers shall have 1/8" of clearance to the duct in which they are installed. Splitter dampers shall be controlled by one or more control rods. Where splitters are in concealed inaccessible locations, submit proposed control rod details for approval.
- H. Transitions: Ductwork transitions and offsets shall be constructed in accordance with Fig. 2-7 of the SMACNA manual.
- I. Branch Taps: Branch taps, including taps to terminal units, shall be 45° entry expanded taps and shall be in accordance with Fig. 2-6 of the SMACNA manual. Taps to terminal units may be Flexmaster STO side takeoff fittings. Dovetail joints on round taps are not permitted. All branches in constant volume systems and branches in ducts downstream of air terminal units shall be equipped with balancing dampers.
- J. Turning Vanes: Turning vanes shall be installed where shown on the Drawings and in all abrupt elbows and bends greater than 45°. For ducts less than 12" in height, single vane blades may be installed. For ducts 12" high and above, double airfoil blades shall be used. Turning vanes shall be constructed in accordance with Figures 2-3 and 2-4 of the SMACNA manual.
- K. Radius Elbows: Radius elbows shall be used where shown on the Drawings and may be used for all 45° and 90° elbows if they fit in the available space, and all elbows 12" and smaller. Radius elbows shall be constructed in accordance with Figure 2-2 of the SMACNA manual.
- L. Weather Exposed: Ductwork that is exposed to weather shall be painted with a suitable epoxy coating. Sections shall be joined using Ductmate or TDF joining method, no substitutes.

2.4 LOW VELOCITY ROUND DUCTWORK (BRANCH RUN-OUTS)

- A. Rigid round low pressure, low velocity ductwork material, gauge, transverse joints and longitudinal seams shall be in accordance with SMACNA Standards, with the following exceptions:
 - 1. Draw band transverse joints are not acceptable.
 - 2. Minimum duct/fitting gauge shall be 26 gauge.
 - 3. "Adjustable" elbows and fittings are not acceptable.
 - 4. All longitudinal seams shall be "Groovelock".

2.5 FLEXIBLE DUCTWORK

- A. General: Flexible duct shall be used where flexible duct connections are shown on the Drawings to air distribution devices and terminal units. Maximum length shall be 4'-0" for

terminal units and 5'-0" for air distribution device connections. Where longer runs are required, provide rigid round ductwork.

B. Flexible Duct:

1. Insulated flexible duct shall be a factory-fabricated assembly consisting of a galvanized steel or spiral aluminum helix.
2. Inner liner shall be a smooth, airtight CPE film.
3. Insulation shall be fiberglass with a maximum thermal conductance of 0.167 BTUH/HR/SF/°F at 75°F mean temperature (R Value = 6).
4. The assembly shall be sheathed in a reinforced metalized Mylar vapor barrier outer jacket with permeance not exceeding 0.17 perms/sf at 1" pressure.

C. Standards: The flexible duct assembly shall be suitable for a minimum working pressure of +6" w.g. and -4" w.g. and shall be listed Class I Air Duct by the Underwriters Laboratory (UL-181) at a flame spread of not over 25 and a smoke developed rate of not over 50. Ducts shall also comply with NFPA Standard 90A.

D. Connections: All joints and connections shall be made with 1/2" wide stainless-steel duct clamps or 100% nylon self-locking clamps. Refer to Details on Drawings.

E. Installation: Flexible ducts shall be supported in such a manner to prevent sags and kinks. Bends in any length of flexible duct shall not exceed a total turning of 90°. Extend insulation and outer jacket over the secured clamp and tape down to the sleeve/collar to maintain vapor barrier integrity. "R-value" of 6 must be maintained through installation. Insulation on flexible duct shall not be compressed.

F. Manufacturers: If it complies with these Specifications, flexible ductwork of the following types will be acceptable:

1. Thermaflex M-KE
2. Peppertree Type HM
3. Or approved substitution

G. Acoustical Flexible Ductwork: Core material shall be an acoustical Spun Bond Nylon fabric supported by helically wound galvanized steel. The fabric shall be mechanically fastened to the steel helix without the use of adhesive. The core shall maintain its free area and a centerline radius of 1.0 or better. Flexible ductwork shall be tested in accordance with ASTM E477. The R-value shall be at least 6.0 at a mean temperature of 75°F. The ductwork shall be UL 181 listed, Class 1 air duct and comply with NFPA 90A and 90B.

1. Minimum Acoustic Performance

	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
8" diameter	27	27	32	33	37	33

2. Acoustical flexible ductwork shall be Flexmaster Type 6MR6 or approved equal.

2.6 ACCESS DOORS

- A. Provide Flexmaster "The Inspector Series" - Spin Door for Field Fabrication and Tab Door for Shop Fabrication, or approved equal dual wall, insulated, access doors in ductwork as required for access to fire, smoke and fire/smoke dampers, duct smoke detectors, sampling tubes, humidifiers, hot water coils (one door on each side), and other duct mounted devices. Door size shall not be less than 2" in diameter smaller than the depth of the duct in which it is to be installed.

2.7 PROVISIONS FOR LOUVERS

- A. Louvers with 1/2" mesh birdscreen shall be furnished and installed by the General Contractor under another Division. This division shall furnish motorized or gravity control dampers, insulated sheet metal plenums, and duct connections to louvers as required, and where shown on the Drawings. All unused portions of louvers shall be blanked off with 18-gauge galvanized sheet metal and insulated with 1-1/2" rigid fiberglass board insulation.

2.8 PARTITION PENETRATION SLEEVES

- A. Provide 22-gauge sheet metal sleeves in all non-ducted air path partition penetrations shown on the Drawings where return air boots (RAB), combination fire and smoke dampers (FSD), fire dampers (FD), etc., are not provided. Coordinate location and size of all partition penetration sleeves with the partition Contractor. Sleeves shall be fabricated with 1/2" flanges, turned out on one end. Sleeves shall extend through wall on both sides.

2.9 KITCHEN EXHAUST DUCTWORK

- A. All exhaust ductwork serving kitchen hoods; ranges and ovens shall be fabricated of minimum 18-gauge 316 stainless steel with liquid tight continuous external welds in accordance with NFPA 96-2001 and applicable SMACNA Standards. Access doors of the type, size and spacing required by NFPA and shown on the Drawings shall be provided. No turning vanes, dampers, or other interior intrusions shall be installed in kitchen exhaust ductwork. All changes in direction shall be with radius elbows (centerline radius equal 1.5 x duct width). Slope duct towards hood connections and cleanout points as shown on the drawings. Refer to Section 20 07 00 for insulation of kitchen exhaust ductwork. Coordinate required rated enclosure of kitchen exhaust duct with the General Contractor. Provide rated access doors for installation by the General Contractor at duct access door locations.

2.10 STAINLESS STEEL EXHAUST DUCTWORK

- A. Provide stainless steel exhaust ductwork for battery charging rooms, dishwasher exhaust systems, and where shown on the Drawings. Ductwork shall be rectangular or round duct fabricated with minimum 18-gauge 316 stainless steel with liquid tight continuous external welds and shall conform in all respects to NFPA 45 (Current Edition) and applicable SMACNA Standards. Duct shall have access panels on the side of the duct large enough to permit inspection and cleaning at each change of direction and at 20 feet on center for horizontal or vertical runs. Access panels shall be of the same material or gauge as the duct and shall be liquid tight when in place.

2.11 ALUMINUM EXHAUST DUCT

- A. Aluminum exhaust duct serving kitchen dishwasher hoods shall be rectangular or round duct fabricated with minimum 14-gauge aluminum with liquid tight continuous external welds and constructed in accordance with applicable SMACNA Standards. Ducts shall have access panels on change of direction and at 20 feet on center for horizontal or vertical runs. Access panels shall be liquid tight when in place. Slope exhaust duct to drain towards hood connections or exhaust grilles for drainage of condensation.

2.12 MEDIUM PRESSURE SPIRAL SEAM DUCTWORK

- A. Medium pressure duct shall be round spiral seam sheet metal constructed as specified herein and in accordance with the Second Edition (2005) of SMACNA "HVAC Duct Construction Standards".
- B. Duct and fittings shall be manufactured from galvanized sheet metal outlined in Section 2.02, Paragraph A. All fittings shall be factory fabricated, machine formed and welded from galvanized sheet metal with built-in couplings. The minimum gauge of duct and fittings shall be 26 gauge.
- C. Spiral duct and fittings joints shall be assembled, suspended, sealed, and taped per manufacturer's published assembly and installation instructions. Horizontal and vertical ductwork supports shall be as recommended by the duct manufacturer and shall not have any screws through the ductwork.
- D. Duct cements for use at couplings shall be United Sheet Metal Uni-Weld metal cement or an approved substitute and shall be used per the manufacturer's recommendations. Duct sealer shall be the United Sheet Metal Uni-Cast System, or an approved substitute utilizing an adhesive, tape and coating to obtain a complete duct seal.
- E. Provide standard 90-degree conical fittings connections for branch takeoffs.
- F. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. United McGill
 - 2. Gowco, Inc.
 - 3. GRACO
 - 4. TD Mechanical

2.13 HIGH VELOCITY SPIRAL ROUND DUCTWORK

- A. Dust Collector Systems: All ductwork connected to dust collector systems shall be high pressure, high velocity, single wall spiral round ductwork and fittings.
- B. High velocity, high pressure duct shall be round spiral seam sheet-metal constructed as specified herein and in accordance with the Second Edition (2005) of SMACNA "HVAC Duct Construction Standards".

- C. Duct shall be capable of withstanding duct pressures up to 6" W.G. and duct velocities in the 2000-4000 FPM range. Duct leakage in excess of 1% will not be acceptable.
- D. Duct and fittings shall be manufactured from galvanized sheet metal outlined in Section 2.02, Paragraph A. All fittings shall be factory fabricated, machine formed and welded from galvanized sheet metal with built-in couplings. The minimum gauge of duct and fittings shall be 26 gauge.
- E. Spiral duct and fittings joints shall be assembled, suspended, sealed, and taped per manufacturer's published assembly and installation instructions. Horizontal and vertical ductwork supports shall be as recommended by the duct manufacturer and shall not have any screws through the ductwork.
- F. Duct cements for use at couplings shall be United Sheet Metal Uni-Weld metal cement or an approved substitute and shall be used per the manufacturer's recommendations. Duct sealer shall be the United Sheet Metal Uni-cast System or an approved substitute utilizing an adhesive, tape and coating to obtain a complete duct seal.
- G. Provide standard 90° conical fittings connections for branch takeoffs.
- H. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. United McGill
 - 2. Gowco, Inc.
 - 3. GRACO
 - 4. TD Mechanical

2.14 DUAL-WALL SPIRAL SEAM DUCTWORK

- A. Exposed Systems: All ductwork exposed within occupied areas shall be spiral round dual wall with internal insulation and perforated inner wall similar to United McGill Acusti-K-27. Finish on duct (painting, etc.) shall be as shown on Drawings.
- B. Round supply air spiral seam dual-wall ductwork shall have a perforated or solid inner liner with 2" thick, 1PCF density fiberglass insulation between the inner liner and the duct itself. At the contractor's option, two (2) layers of 1-1/2" thick, 3/4 PCF insulation compressed to 2". Average thermal conductivity (k - value) shall be not more than 0.23 Btu•In/Hr•SF•°F at 75°F mean temperature. "R" value of insulation shall be a minimum of 8 if installed outdoors or in an unconditioned space, and 6 if installed indoors.
- C. All outer shell materials, gauges, and sealing shall conform to Table 3-2A and referenced publications as noted in the 2005 SMACNA Duct Construction Standards.
- D. Duct and fittings shall be manufactured from galvanized sheet metal outlined in Section 2.02, Paragraph A. All fittings shall be factory fabricated, machine formed and welded from galvanized sheet metal with built-in couplings. The minimum gauge of duct and fittings, internal and/or external wall, shall be 26 gauge.
- E. Spiral duct and fittings joints shall be assembled, suspended, sealed, and taped per manufacturer's published assembly and installation instructions. Horizontal and vertical

ductwork supports shall be as recommended by the duct manufacturer and shall not have any screws through the ductwork.

- F. Duct cements for use at couplings shall be United Sheet Metal Uni-Weld metal cement or an approved substitute and shall be used per the manufacturer's recommendations. Duct sealer shall be the United Sheet Metal Uni-Cast System or an approved substitute utilizing an adhesive, tape and coating to obtain a complete duct seal.
- G. Provide standard 90-degree conical fitting connections for branch takeoffs.
- H. The General Contractor shall paint all exposed ductwork, with a color selected by the architect.
- I. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. United McGill
 - 2. Gowco, Inc.

2.15 FLUE GAS VENTS

- A. Furnish and install double wall vent flues and accessories for all boilers and water heaters as indicated on the Drawings.
- B. Factory-built flues shall be laboratory tested and listed by the Underwriter's Laboratories, Inc. for use with the specified equipment burning gas or liquid fuels as described in NFPA 211, which produce exhaust flue gasses at a temperature not exceeding 1400°F under continuous operating conditions.
- C. The double wall flue shall have an outer jacket of Type 304 stainless steel 0.025" thick for sizes 6" through 24" and 0.034" thick for larger diameters. There shall be minimum 1" air space between the walls. The inner liner shall be 0.035" nominal thickness for all diameters.
- D. The flues shall comply with all national safety standards and building codes when installed according to the manufacturer's pre-printed installation instructions and the limits of its listing.
- E. Inner pipe joints shall be sealed by use of V bands and RTV Silicone sealant for flue gas temperature up to 600°F. For flue gas temperatures above 600°F, joints shall be sealed with V bands and High Temperature Joint Cement as outlined in the installation instructions supplied by the manufacturer.
- F. Flues extending above the roof shall be terminated as required by local codes or as required by NFPA 211, whichever is more stringent and shall be a minimum of 4 feet above the finished roof with a factory supplied flue cap. Wind bracing or tiebacks shall be provided as required.
- G. The actual design of each vent flue system shall follow the layout shown on the Drawings but shall be completely laid out and calculated by the flue manufacturer to suit actual equipment served, field conditions and thermal expansion considerations.

Provide straight sections, elbows, offset, increasers, tees, equipment, connections, supports, drains, ventilated roof thimble/flashing assemblies, stack caps and other required accessories. If recommended by the manufacturer for the proposed installation, a drain section with drain piping and trap shall be provided in vertical stacks.

- H. Flues shall be Model PS as manufactured by Amerivent or Selkirke Metalbestos, or Unit-Stack 1400 Series as manufactured by United McGill Corporation.

2.16 DOUBLE WALL METAL VENTS

- A. Available Manufacturers: Subject to compliance with requirements of applicable codes, provide Type B double wall gas vents as manufactured by Selkirk Metalbestos or acceptable equal.
- B. Double wall gas vents, UL listed for Type B, consisting of an inner pipe of sheet aluminum, and outer pipe of galvanized sheet steel, with the following minimum thickness.

SIZE	INNER PIPE	OUTER PIPE
ROUND, UP TO 6"	0.012"	28 GAUGE
ROUND, 7" TO 18"	0.014"	28 GAUGE

- C. Provide UL labeled tees, elbows, increasers, draft hood connectors, metal cap with bird barrier, adjustable roof flashing, storm collar, support assembly, thimbles, fire stop spacers and fasteners, fabricated of similar materials and design as vent pipe straight sections.

2.17 RADIATION PROTECTION

- A. Provide lead wrap on ductwork penetrating protected partitions of various radiotherapy rooms to meet requirements of the Owner's radiation physicist.

PART 3 - EXECUTION

3.1 SUBMITTAL

- A. Ductwork shop drawings shall be made after job site measurements are made and shall be coordinated with all other trades. Ductwork construction details and materials shall be submitted and approved prior to fabrication of any ductwork. Ductwork submittal shall include ductwork fabrication drawings and submittal data on ductwork specialties and construction details.
- B. Ductwork fabrication drawings shall be drawn to scale on 1/8" or larger scale building floor plans and shall indicate duct sizes, duct material, duct insulation type, locations of transverse joints, fittings, ductwork bottom elevation, offsets, ductwork specialties, fire and fire/smoke dampers and all other information required for coordination with other

trades and fabrication of ductwork. All fire and fire/smoke partitions shall be clearly designated on the ductwork shop drawings. Detail drawings for mechanical rooms and air handling unit locations shall be drawn to 1/4" scale.

- C. Duct fabrication drawings shall be coordinated with other trades and building construction prior to submittal for approval, and shop drawings shall be so certified on each drawing.

3.2 INSTALLATION

- A. Install all ductwork tight to structure unless otherwise noted. The Mechanical Contractor shall coordinate with all other trades prior to the construction or installation of ductwork.
- B. Install duct mounted sensors and control devices furnished under Section 23 09 16. Furnish and install access doors at each duct mounted control device. Coordinate location of devices and installation requirements with the Automatic Temperature Control Subcontractor.
- C. Install duct type smoke detectors furnished under Division 28. Furnish and install access doors at each sampling tube assembly. Coordinate location of detectors and installation requirements with the Electrical Subcontractor.
- D. Furnish and install access doors at all fire dampers, smoke dampers, and combination fire/smoke dampers.
- E. Ductwork shall be thoroughly cleaned or verified as clean prior to fan startup. Reference Section 20 05 05 for related issues.
- F. Roof mounted duct shall be secured to roof with equipment support curbs as per Section 20 05 02. Refer to 20 05 02 for wind design criteria.

3.3 LEAK TESTING

- A. Ductwork constructed to operate at +2" w.g. or greater or -2" w.g. or less shall be leak tested in accordance with the following:
 - 1. Contractor shall test duct for leakage in accordance with the "System Pressure Testing for Leaks" publication by United McGill Corporation apparatus used for testing shall be as noted in referenced publication. Deviations from this shall not be permitted.
 - 2. Duct systems shall be pressurized to 125% of rated system pressure classification as described in Subsection 2.01 of this Section.
 - 3. Maximum allowable leakage shall be in accordance with Subsection 2.02 of this Section.
- B. Ductwork constructed to operate at pressures between -2" w.g. and +2" w.g. shall be visually inspected for leakage.
 - 1. Engineer may request ductwork leakage test, in accordance with Paragraph A. of this Subsection, if in his opinion, testing is warranted due to installation of duct systems or information contained in test and balance report.

- C. Ductwork leak testing and/or inspection shall be performed prior to installation of external ductwork insulation.
- D. If requested by the Engineer, Contractor shall schedule duct leakage testing and/or inspection so that it may be witnessed by Engineer.

END OF SECTION

SECTION 23 33 10

AIR DISTRIBUTION DEVICES AND DAMPERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. General: Furnish and install air distribution devices as shown, scheduled, specified, and required. Devices shall be complete with all required mounting accessories for installation in the actual construction at the installation location.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Ductwork and Sheet Metal - Section 23 31 13

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Air Distribution Devices:
 - a. Krueger
 - b. Metal*Aire
 - c. Nailor
 - d. Price Company
 - e. Tuttle & Bailey
 - f. Titus
 - 2. Dampers:
 - a. Air Balance, Inc.
 - b. American Warming and Ventilating Company
 - c. Greenheck

- d. National Controlled Air
- e. Ruskin Manufacturing Company
- f. Nailor
- g. Flexmaster
- h. Pottorff

PART 2 - PRODUCTS

2.1 AIR DISTRIBUTION DEVICE GENERAL REQUIREMENTS

- A. General: Provide air distribution devices of the size, shape, and type constructed of materials and components and with finishes as specified, scheduled, and shown. Grilles, registers, and ceiling diffusers shall be provided with neoprene or soft felt gaskets. If a manufacturer other than the one scheduled is used, the sizes shown on the Drawings shall be checked for performance, noise level, face velocity, throw, pressure drop, etc., before the submittal is made. Selections shall meet the manufacturer's own published data for the above performance criteria. The throw shall be such that the velocity at the end of the throw in the five-foot occupancy zone will be not more than 50 fpm nor less than 25 fpm. Noise levels shall not exceed those published in the ASHRAE Applications Handbook for the type of space being served (NC level) except none shall exceed NC 35.
- B. Surface Compatibility: Air distribution devices shall have frames fully compatible with the ceiling, wall, and floor surfaces in which they are installed and shall be provided with all required mounting accessories for installation in the actual construction at the installation location. Provide concealed fastening on all surfaces.
- C. Finishes: All ceiling and wall mounted air devices shall have corrosion resistant treated surfaces and be painted white or off-white with baked enamel unless specified otherwise and all air devices shall be the same color. Where the factory finish on all devices is not the same as determined by the Architect/Engineer, the Division 23 Contractor shall be responsible for coordinating field painting of all air devices by the Division 9 Contractor. The Division 23 Contractor shall be responsible for all costs associated with Division 9 field painting of white or off-white air devices. Special color painting of air devices shall be the responsibility of the Division 9 Contractor. The Architect/Engineer's decision on white color compatibility is final. The interior of all perforated plate diffusers shall be painted flat black. All steel components shall be fully phosphatized prior to painting and there shall be no unpainted steel parts.
- D. Ceiling Diffusers: Provide opposed blade volume control dampers with supply air diffusers where diffusers are installed above inaccessible ceilings and where scheduled. Where applicable, provide adapters with diffusers to permit connection to round supply duct. Perforated plate supply air diffusers shall have pattern control blades installed in the diffuser neck unless noted otherwise. Pattern controllers attached to the perforated plate are not acceptable. Provide concealed fastening on all ceiling diffusers. Device neck size shall be as shown on the Drawings.
- E. Registers and Grilles: Provide registers that contain a key-operated opposed blade damper operable from the face side where registers are ducted and installed in inaccessible surfaces. Supply air registers shall be of the double deflection type. Return

air grilles and registers shall have fixed face blades and match the face of the supply air ceiling diffusers, unless otherwise indicated. Provide concealed fastening for all registers and grilles.

F. High Induction Perimeter Supply/Return Slot Diffuser:

1. Provide slot-type supply/return (where scheduled) diffuser with length and width scheduled or shown on the Drawings. The supply/return diffuser shall be installed above the ceiling and located as indicated on the Architectural and Mechanical Drawings. The perimeter supply linear slot diffusers shall have an internal, fixed, curved, extruded aluminum, aerodynamically shaped outlet designed to provide the maximum amount of induced secondary room air. The return air slot (where scheduled) shall be located so that the supply air pattern will not be affected. The supply air shall be discharged horizontally along the ceiling with a down discharge center section (where scheduled).
2. The diffuser shall be designed, tested, and constructed in a manner so as to comply with the performance criteria and sound level requirements specified hereinafter. Diffuser shall be constructed of at least 24-gauge galvanized steel and shall be reinforced as required. The air volume, length and duct connection size shall be as scheduled or shown on the Drawings. The diffuser manufacturer shall coordinate the attachment, support, tee spacing, and similar features of the diffuser with the ceiling Sub-contractor.
3. The entire assembly shall be tested as a unit at the manufacturer's laboratory. Submit certified copies of the test results to the Engineer for review. The test data shall include AK factors for an Anor velometer, sound data, diffuser static pressure drop, horizontal air throw, and drop for the air supply rates per lineal foot of diffusers indicated below. The test data shall be based on a 55°F air supply temperature, a 20°F temperature differential and an 85°F heating supply air temperature.
4. The diffuser shall be painted flat black on interior surfaces and the exposed surfaces as viewed from below the ceiling system shall be painted flat black.
5. The perimeter ceiling supply/return linear slot diffuser shall be similar to the Titus Model scheduled and detailed on the Drawings and shall be designed to equal or exceed the following performance characteristics:

TITUS NOVA MODEL - N1 (R WITH RETURN SLOT)			
CFM/LIN. FT. DIFFUSER	MAX. DIFFUSER STATIC PRESSURE LOSS – IN. W.C.	THROW @ 50 FPM TERMINAL VELOCITY	NC LEVEL*
30	0.1	7'	LESS THAN 20
50	0.1	12'	LESS THAN 20
70	0.1	17'	LESS THAN 20
80	0.13	20'	LESS THAN 25
90	0.16	25'	LESS

			THAN 30
100	0.18	27'	LESS THAN 35

*Based on 10 dB room absorption.

2.2 AIR DISTRIBUTION DEVICES

- A. Perforated Plate Supply Air Device - Type A: Perforated plate supply air devices shall be aluminum and/or steel construction with an aluminum face and aluminum or steel pans. Frames shall have miter joint corners and steel frames shall be one-piece integral with the back pan. Perforated faces shall have a concealed hinge mechanism such that the plate remains attached to the frame when opened. Diffusers shall incorporate internal pattern control louvers. The use of pattern control devices attached to the perforated plate is not acceptable. Air devices shall have 4-way diffusion pattern unless noted otherwise on the drawings. Metal*Aire Series 7600, Titus Type PSS-AA, Carnes Model SPFC, or Price Co. Model APDN.
- B. Fire Rated Perforated Plate Supply Air Device - Type A: Perforated plate supply air devices shall be aluminum and/or steel construction with an aluminum face and steel back pan and shall be U.L. listed for use in roof/ceiling assemblies specified for this project. Frames shall have miter joint corners and steel frames shall be one-piece integral with the back pan. Perforated faces shall have a concealed hinge mechanism such that the plate remains attached to the frame when opened. Diffusers shall incorporate internal pattern control louvers. The use of pattern control devices attached to the perforated plate is not acceptable. Air devices shall have 4-way diffusion pattern unless noted otherwise on the drawings. Air devices shall be provided with all required dampers, thermal links and ceramic fiber blankets. Ceramic fiber blankets shall be enclosed in an approved mesh material to allow easy handling of the blankets. Air device shall be supported in accordance with UL requirements. Refer to Radiation Damper requirements herein for additional requirements. Metal*Aire Series 7600, Titus Type PCS-AB, Carnes Model SPFC, or Price Co. Model APDN.
- C. Perforated Plate Exhaust/Return Air Device - Type B: Perforated plate exhaust and return air devices shall be aluminum and/or steel construction with an aluminum face and aluminum or steel pans. Frames shall have miter joint corners and steel frames shall be one-piece integral with the back pan. Perforated faces shall have a concealed hinge mechanism such that the plate remains attached to the frame when opened. Titus Type PAR-AA, Metal-Aire Series 7000, Carnes Model SPJB, or Price Co. Model APDDR.
- D. Fire Rated Perforated Plate Exhaust/Return Air Device - Type B: Perforated plate exhaust and return air devices shall be aluminum with all steel back pan and shall be U.L. listed for use in roof/ceiling assemblies specified for this project. Frames shall have miter joint corners and steel frames shall be one-piece integral with the back pan. Perforated faces shall have a concealed hinge mechanism such that the plate remains attached to the frame when opened. Air device shall be supported in accordance with U.L. requirements. Refer to Radiation Damper requirements herein for additional requirements. Titus Type PAR, Metal-Aire series 7500R, Carnes Model SPJB, or Price Co. Model APDDR.

- E. Louver Face Ceiling Supply Air Device - Type C: Louver face square ceiling supply diffusers shall be all aluminum construction with mitered corner frames. The entire grille shall have a factory applied white or off-white baked enamel finish. Air devices shall have 4-way diffusion pattern unless noted otherwise on the drawings. Titus Model TMS-AA, Metal-Aire Series 5800, Carnes Model SFTB, or Price Co. Model ASCD.
- F. Plaque Face Supply/Return Air Device - Type D/E: Plaque face supply air devices shall be aluminum construction with an aluminum face and aluminum or steel pans. Frames shall have miter joint corners and steel frames shall be one-piece integral with the back pan. Plaque face shall extend a maximum of 1/4" below face of diffuser. Air devices shall have 4-way diffusion pattern unless noted otherwise on the drawings. Titus Type Omni-AA, or Nailor AUNI.
- G. Double Deflection Wall Supply Grille - Type F: Wall supply grilles shall be louver face all aluminum construction with 3/4" airfoil front vertical and rear horizontal double deflection blades, mitered frames and an opposed blade balancing damper. Titus 272FS5, or Price Co. Model C22C.
- H. Louver Face Wall Exhaust/Return Air Device - Type G: Louver face wall exhaust/return grilles shall be all aluminum construction with horizontal 45° louvers set down on 1/2" centers, mitered frames and an opposed blade balancing damper where scheduled. Titus Core 4FL Metal-Aire Model RHD, Carnes Model RWNSH, or Price Co. Model 530/F/3.
- I. Sidewall Stair Pressurization Register - Type H: Extruded register with horizontal fixed blade removable core (no vertical adjustable rear blades), key-operated opposed blade volume control and curved gasketed frame with concealed screw fastening. Titus Model 1735, Price Model LBMR/3, Metal*Aire Series Revers-A-Core 41.
- J. Linear Slot Air Devices - Type I: Devices shall be continuous, extruded aluminum slot diffusers with mitered corners. Diffusers shall have 3/4" slots and shall have steel or extruded aluminum pattern control blades (supply slots only). The pattern control blades shall have a factory applied flat black baked enamel finish. Provide insulated supply air plenums as shown on the Drawings. Titus Type ML-38 (supply slot)/MLR-38 (return slot), Metal*Aire Model 6075 (supply and return slots), or Price Co. Model SDS 75/SDR 75.
- K. Linear Bar Slot Air Devices - Type J: Linear bar slot air devices shall be continuous, extruded aluminum slot diffusers with mitered corners. Diffusers shall have bars on 1/2" centers with 0° or 15° deflection as scheduled. Provide insulated supply air plenums as shown on the Drawings. Titus CMT-15 (0° deflection)/CMT-16 (15° deflection), Metal*Aire Series 2000, or Price Co. Model LBP16C.
- L. Tee-Bar Slot Air Devices - Type K: Devices shall be high induction, side inlet slot diffusers with length and neck size as shown on the Drawings. The diffusers shall have an aerodynamically designed, extruded aluminum, Venturi shaped air outlet designed to direct supply air from the ends of the diffuser horizontally across the ceiling and to provide maximum aspiration and entrainment of room air. The supply air shall maintain a ceiling pattern with varying volumes of air to minimum flow. Supply air from the center section shall be in a downward vertical throw pattern. The diffuser shall have a maximum height of 9" and shall be completely supported by two ceiling tees on nominal

2-3/4" centers. The diffuser shall be constructed of minimum 24-gauge non-rusting steel and all surfaces exposed to view below the ceiling shall be painted flat black. Titus Nova N-1-D and N-4-D Series, Price Co. Model TBDV675, or Metal*Aire Series HPD-DB.

- M. Tee-Bar Slot Air Devices - Type L: Devices shall be high induction, side inlet slot diffusers with length and neck size as shown on the Drawings. The diffusers shall have an aerodynamically designed, extruded aluminum, Venturi shaped air outlet designed to direct supply air from the ends of the diffuser horizontally across the ceiling and to provide maximum aspiration and entrainment of room air and a 2" outside return air slot to draw return air over the back and top of the diffuser to improve induction and minimize outside wall effect. The supply air shall maintain a ceiling pattern with varying volumes of air to minimum flow. Supply air from the center section shall be in a downward vertical throw pattern. The diffuser shall have a maximum height of 9" and shall be completely supported by two ceiling tees on nominal 5-1/4" centers. The diffuser shall be constructed of minimum 24-gauge non-rusting steel and all surfaces exposed to view below the ceiling shall be painted flat black. Titus Nova N-1-DR and N-4-DR Series, Price Co. Model TBDV675R, or Metal*Aire Series HPDR-DB.
- N. Architectural Linear Supply Slot Diffuser - Type M: Continuous slot diffuser with 1-1/2" slot and "jet throw" pattern controller. Titus "High Throw" Flowbar FL-15-JT, or Nailor Flowline FLV15.
- O. Architectural Linear Supply Slot Diffuser - Type N: Continuous slot diffuser with 1-1/2" slot and "jet throw" pattern controller. Titus "High Throw" Flowbar FL-15-HT, or Nailor Flowline FLH15.
- P. Underfloor Air "Swirl" Supply Diffuser - Type O: Round swirl diffuser shall be nominal 8" diameter and constructed of high impact polycarbonate plastic, complying with UL Std. 94-5V for flammability. The diffuser shall incorporate a removable dust/dirt collection basket. The diffuser shall incorporate adjustable mounting claps which allow installation from above the floor without removal of the floor panel. Swirl diffuser shall be provided with a flow regulating damper, adjustable without removing core, with visual open/closed indication and adjustable minimum volume stop. Finish color shall be gray. Nailor ANFD or approved equal. Furnished under Tenant Improvement contract.
- Q. Troffer Supply Boots - Type P: Boots shall be low leakage dual outlet type suitable for use with the light troffers installed on the project. Troffer boot inlet neck size shall be as shown on the Drawings. Each troffer boot shall consist of a supply plenum on each side of the light fixture with a cross-over plenum and duct connection. The plenums shall be internally insulated at the factory and shall be factory painted flat black on exposed and inner surfaces visible from below the ceiling. Plenums shall be minimum 24-gauge galvanized steel and shall be airtight, with alignment tabs and a stiffening flange on each side. The troffer boot manufacturer shall coordinate attachment and design of the troffer boot with the furnished light fixtures such that the troffer and boot combination will direct the supply air horizontally across the ceiling with minimum leakage. Titus LTTI/LPTI Type, Price Co. Model LTL/LP, Metal*Aire DSI, or listed manufacturer approved equal.
- R. Troffer Supply Boots - Type Q: Boots shall be low leakage single outlet type suitable for use with the light troffers installed on the project. Troffer boot inlet neck size shall be as shown on the Drawings. Each troffer boot shall consist of a supply plenum on one side of the light fixture with a duct connection. The plenums shall be internally insulated at

the factory and shall be factory painted flat black on exposed and inner surfaces visible from below the ceiling. Plenums shall be minimum 24-gauge galvanized steel and shall be airtight, with alignment tabs and a stiffening flange. The troffer boot manufacturer shall coordinate attachment and design of the troffer boot with the furnished light fixtures such that the troffer and boot combination will direct the supply air horizontally across the ceiling with minimum leakage. Titus LTTI/LPTI Type, Price Co. Model LTL/LP, Metal-Aire Series BT, or listed manufacturer approved equal.

- S. Jet Air Diffuser - Type R: Diffusers shall have multiple 15" diameter cylindrical/conical type assemblies capable of delivering either a jet-type air stream or a diffused air pattern depending on their position adjustment. Units shall have directional control capable of directing flow vertically within a 60°F arc. Diffusers shall deliver scheduled air flow with maximum 0.10-inch static pressure loss, and group NC less than 35 NC. The contractor shall adjust direction and jet, or diffuse supply air orientation as required to evenly distribute air to the atrium floor area. Provide plenum mounted opposed blade dampers for volume control. Diffusers shall be Anemostat Model DJ or approved equal.
- T. Tee Bar Return Air Boots - Type S: Boots shall be minimum 24-gauge galvanized sheet metal, constructed as detailed on the Drawings. The entire boot shall be painted flat black and shall have an appearance similar to the project supply air slot diffusers when installed. Price Model TBR.
- U. Automatic Supply Air Device - Type T: Automatic supply air devices shall have an 18-gauge steel face panel mounted on an aerodynamically shaped, one-piece, seamless steel back-pan. The exposed surface of the face panel shall be smooth, flat, and free of visible fasteners, and have an aerodynamically shaped, hemmed edge. Finish shall be a thermoset alkyd melamine enamel paint, properly applied. Diffusers shall incorporate an electronic mechanical device variable air volume mechanism to vary the diffuser discharge air opening to adjust supply air volume in response to room temperature. The VAV mechanism shall be a totally self-contained and replaceable module. Controls shall be microprocessor based and shall be normally open on power failure or disruption. Provide one remote hand-held digital display unit for adjustment of temperature setpoints. Titus Zeon series, or approved equal.
- V. Round Supply Air Ceiling Diffuser - Type U: Round ceiling diffusers shall have three (3) round cones and round neck inlets (sizes shown on plans). Diffusers shall have two (2) horizontal discharge settings and 360° discharge pattern. Titus TMR-AA or approved equal.
- W. Louver Face Ceiling Return Air Device - Type V: Louver face square ceiling return diffusers shall be all aluminum construction with mitered corner frames. The entire grille shall have a factory applied white or off-white baked enamel finish. Titus Model TMS-AA, Metal-Aire Series 5800, Carnes Model SFTB, or Price Co. Model ASCD.

2.3 DAMPERS

A. Fire Dampers:

1. Furnish and install dynamic fire dampers at all locations shown on the drawings and as required. All fire dampers shall be UL labeled as Dynamic Fire Dampers

- and shall meet all the requirements of the current edition of NFPA 90A and UL Standard 555.
2. Dampers shall be activated by a UL approved fusible link that shall automatically close the damper upon operation. Fusible links shall operate at approximately 50°F above the maximum temperature in the duct system in normal operation, but not less than 165°F. All dampers associated with Life Safety Systems shall have minimum 212°F fusible links. Hinged dampers shall have stainless or cadmium plated spring steel catches. All dampers shall have spring closure to ensure positive shut-off at velocities up to 4000 fpm and pressures up to 4" w.g.
 3. Dampers installed in one-hour and two-hour rated assemblies shall be UL rated at one and one-half (1-1/2) hours per UL Standard 555 and shall be Ruskin Type DIBD2 Style B and C, Air Balance Type B or C, National Controlled Air, or listed manufacturer approved equal.
 4. Dampers shall be sized so that the free area space is not less than 90% of the connected duct free area space for low velocity, low pressure ductwork and 100% of the connected duct free area space for high velocity, high pressure ductwork. Dampers shall be installed so as to provide a positive barrier to the passage of air when in the closed position. Dampers shall be installed with angle iron frames and slip joint connections per manufacturer's installation requirements and SMACNA Standards such that they are self-supporting in the case of duct destruction due to heat. The installing contractor shall be responsible for coordinating locations that require special sleeves.
 5. Provide access doors as specified under DUCTWORK for all internally actuated dampers. Where duct access doors are installed in non-accessible locations, provide ceiling or wall access doors. Label duct access doors "FIRE DAMPER ACCESS" with 1/2" high black stencil letters.

B. Fire/Smoke Dampers:

1. Furnish and install dynamic fire/smoke dampers at all duct penetrations of smoke partitions, and as shown on the Drawings or required. Dampers shall be multi-blade opposed blade type combination fire/smoke dampers and shall possess a 1-1/2-hour UL label in accordance with UL Standard 555S and shall meet all requirements of the latest edition of NFPA 90A and 101. Dynamic dampers shall be tested and certified in accordance with AMCA Standard 500-89 and shall be leakage Class I, 250°F per UL Standard 555S.
2. Fire/smoke dampers and operators shall be UL listed and labeled in the sizes used on the project and all dampers on the project shall be by the same manufacturer. UL labeling of damper sizes used on the project shall be clearly indicated on shop drawing submittal.
3. Dampers shall be suitable for opening and closing at static pressure up to 4" w.g. and at air velocities up to 4000 fpm. Damper leakage shall not exceed 4 CFM/SF at 1" w.g. or 8 CFM/SF at 4" w.g.
4. All combination fire/smoke dampers shall include an operating shaft which, when rotated, causes the damper to operate between open and closed. Operating shaft and damper combination by any standard electric damper operator having sufficient torque characteristics. Combination fire/smoke dampers shall be Ruskin Type FSD-60 or an approved equal by Air Balance, Greenheck, National Controlled Air, Safe-Air, or other listed manufacturer with 212°F thermal links and rectangular, round, or oval duct connections as required.

5. Each combination fire/smoke damper shall be furnished complete with factory sleeve, damper operator, thermal link, and position indicating end switch factory installed. The installing contractor shall be responsible for coordinating locations which require a special sleeve and N.O./N.C. features. All dampers shall spring closed upon activation of firestats and fusing of fusible links. Fusible links shall be rated for 212°F. Actuators shall be 120 Volt electric two-position type. Damper operators shall be UL listed as fire damper operators, shall bear the appropriate UL fire damper operator label, and shall be rated for continuous operation at 250°F. Damper operators shall have the following configurations:
 - a. Smoke exhaust system applications: Provide normally closed (N.C.) type operators of the power open/spring - return fail closed type that will close the damper upon loss of control power. Provide end switches for positive position indication.
 - b. HVAC system applications: Provide normally open (N.O.) type operators of the power closed/spring - return fail open type that will open the damper upon loss of control power. Provide end switches for positive position indication.
6. All power and control wiring, and relays to interface the controls with the fire detection and alarm systems shall be furnished and installed under Division 28. Dampers shall be installed with angle iron frames and slip joint connections per manufacturer's recommendations and SMACNA Standards such that they are self-supporting in the case of duct destruction due to heat. The installing contractor shall be responsible for coordinating locations which require special sleeves.
7. Provide access doors as specified under DUCTWORK AND SHEET METAL for all internally actuated dampers and for maintenance inspection of all externally actuated dampers. Where duct access doors are installed in non-accessible locations, provide ceiling or wall access doors. Label duct access doors "FIRE-SMOKE DAMPER ACCESS" with 1/2" high black stencil letters.
8. At the Contractor's option, Fire/Smoke Dampers with manual air balancing capability may be used in lieu of Fire/Smoke Dampers and adjacent Volume Dampers.

C. Radiation Dampers:

1. Ceiling radiation type fire dampers shall be installed in all U.L. design assembly fired rated ceilings in strict accordance with manufacturers U.L. listed installation instructions. Ceiling dampers shall conform to U.L. Standard 555C.
2. Provide Ruskin Model #CFD-EC or listed manufacturer approved equal rectangular or round neck, extended collar, fusible link for up to 20-inch diameter round neck or up to 18 x 18-inch square neck, T-bar 24 x 24 face lay-in diffuser. Air device pan shall be minimum of 24-gauge steel as required by U.L.
3. Diffuser pan insulation shall be 1/2" thick ceramic insulation blanket or 3/4" thick mineral wool insulation blanket. Thermal insulation blankets shall be totally enclosed in an approved jacket material to keep fibers out of the plenum return air stream.
4. Damper blades requiring radiation protection shall utilize sheetrock (gypsum board) attached to the blades.

5. Fusible links shall be accessible from the face of the unit in the open or closed position for test and reset purposes. Removal of duct shall not be required to replace fusible links.

D. VOLUME BALANCING DAMPERS

1. Balancing dampers shall be provided in all zones of multi-zone air handling units, branch taps to all air devices, and where shown on the Drawings. Except for spin-in type, balancing dampers shall consist of single blade dampers on rectangular duct up to 11" high and opposed blade dampers in ducts 12" and larger. Single blade dampers shall be in accordance with Fig. 2-11 of the SMACNA manual and opposed blade dampers shall be in accordance with Fig. 2-12 of the SMACNA manual. Dampers shall be of the following types:
 - a. Single blade dampers for rectangular duct shall be Ruskin MD35 Single Blade Series or an approved equal.
 - b. Opposed blade dampers for rectangular duct shall be Ruskin MD 35/OB or listed manufacturer approved equal.
 - c. Rigid round duct dampers shall be 26-gauge, G90 galvanized damper blade, 3/8" square damper shaft supported by nylon bearings and DuroDyne KR3 quadrant on an elevated platform. Flexmaster SLBO, or approved equal.
 - d. Spin-in damper fittings serving individual air devices shall be Dace Model SMD. Where regulators are installed on externally insulated ductwork, provide stand-off platforms at least 1/4" higher than the insulation thickness.
2. Damper regulators for concealed accessible applications shall be Young Valcalox 400 series or an approved equal. Where regulators are installed on externally insulated ductwork, provide stand-off platforms at least 1/4" higher than the insulation thickness. Where regulators are required in non-accessible locations, provide access doors or Young or equal extension rods, couplings, 90° gear drives, etc., as required, and Young 301 or approved equal flush mounted remote regulator as directed by the Architect.

- E. Automatic Dampers: See Section "Building Control and Automation System" for requirements, including blank-off and transition provisions. Provide access doors for dampers as required.

F. Backdraft Dampers - Counterbalanced:

1. Furnish and install counterbalanced backdraft dampers where indicated on the Drawings. Each damper shall be sized as indicated on the Drawings and shall be suitable for installation in the mounting arrangement shown.
2. Backdraft damper shall be the heavy-duty pressure relief counterbalanced shutter type similar to Ruskin Type CBS4, or listed manufacturer approved equal as follows:
 - a. Damper frame shall be at least 16-gauge galvanized steel or 16-gauge aluminum. Damper frame shall be of channel construction for ductwork mounting or have a front flange when installed in a wall.

- b. Damper blades shall be at least 16-gauge galvanized steel or aluminum. Provide individual counterweights on each blade. The damper shall be capable of maintaining static pressures of 0.05 to 0.20 inches w.g. Furnish tie bars constructed of at least 16-gauge galvanized steel or aluminum on damper sections over 24" wide. After damper has been installed, counterweights shall be adjusted to balance the system static pressure as directed by the Engineer.
- c. Damper blades shall have polyurethane foam, neoprene, or vinyl gaskets glued, riveted, or rolled into blade edges.
- d. Damper bearings shall be bronze oilite, nylon, or cyclopol.
- e. Furnish counterbalanced backdraft dampers with No. 1-1/2 mesh aluminum bird screen for rear mounting where counterbalanced backdraft dampers are mounted in outside walls.

G. Backdraft Dampers:

- 1. Furnish and install backdraft dampers where indicated on the Drawings. Each damper shall be sized as indicated on the Drawings and shall be suitable for installation in the mounting arrangement shown. Backdraft dampers mounted in roof curbs shall be secured to galvanized steel support angles fastened to the curb.
- 2. Backdraft dampers shall be heavy relief type suitable for wall and duct mounting or installation at a fan discharge. Backdraft dampers shall be similar to Ruskin Type BD2-A1 for face velocities to 1500 fpm and Ruskin Type BD2-A2 for face velocities to 2500 fpm, or listed manufacturer approved equal as follows:
 - a. Damper frame shall be constructed of at least 0.090" thick aluminum or at least 18-gauge galvanized steel. Damper frame shall be on channel construction when installed in ductwork or have a front flange when installed in a wall.
 - b. Damper blades shall be constructed of at least 22-gauge extruded aluminum suitable for face velocities up to 1500 fpm and at least 16 gauge extruded aluminum for face velocities to 2500 rpm. Damper blades shall have neoprene or vinyl gaskets riveted or rolled into the blade edge. Each backdraft damper section shall be furnished with tie bars constructed of at least 16-gauge aluminum. Furnish two tie bars on damper sections over 40 inches wide.
 - c. Damper bearing shall be bronze oilite, nylon, or cyclopol.
 - d. Furnish backdraft dampers with 2 x 2 mesh aluminum bird screen for rear mounting where backdraft dampers are mounted in outside walls.
 - e. Damper leakage shall not exceed 12 cfm per square foot of damper face area at 0.5 inches w.g. differential.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittals shall include, but not be limited to, the following:

1. Cut sheets on air distribution devices and dampers showing dimensions, type, construction materials, features, and listing agency details (UL, FM).
2. Performance data on air devices including noise data, throw velocity/distance and pressure drop.

3.2 INSTALLATION

- A. General: Install all materials in accordance with manufacturer's written installation instructions, applicable standards, and recognized industry practices.
- B. Location Coordination: Where air distribution devices are installed in acoustical tile and other ceilings, they shall be either centered on tile or ceiling joints as directed by Architect at job site. Coordinate location of all ceiling air devices with Architectural reflected ceiling plans.
- C. Dampers: All fire, motorized and radiation dampers shall be installed in strict accordance with UL listed installation procedures provided by manufacturer.
- D. Balancing Dampers: Install balancing dampers a minimum of three feet (3') upstream of supply diffusers served and three feet (3') downstream of return/exhaust diffusers served.
- E. Testing: Fire, Fire/smoke, and Radiation damper operation shall be tested after installation is complete. Provide written certification of each damper location, type, size, and date tested as specified in Section 20 05 03.
- F. Access Doors: Provide access doors in ductwork and building construction for dampers as required.

END OF SECTION

SECTION 23 34 10

FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. General Division 20-28 Materials and Methods - Section 20 05 05
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. Furnish and install air moving fans as shown, scheduled, and specified.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Motors and Controllers - Section 20 05 13
 - 2. Electronic Variable Speed Drives - Section 20 05 14
 - 3. Noise and Vibration Isolation - Section 20 05 48

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Fans:
 - a. Greenheck
 - b. Cook
 - c. Twin City
 - d. Acme
 - 2. Fan/Motor Sheaves:
 - a. Browning
 - b. Woods
 - c. Dodge
 - d. An approved equal

3. Belt-driven fans are not acceptable and will require special permission from the Owner.

PART 2 - PRODUCTS

2.1 GENERAL FAN REQUIREMENTS

- A. Refer the mechanical schedules for exact Fan requirements. All Exhaust Fans are to be direct drive. Contact engineer if any items on the drawings or in the specifications contradict this.
- B. Motors shall be heavy duty type, premium efficiency, standard NEMA frame, 900, 1200, or 1800 RPM, TEFC, and compatible with variable frequency drives as scheduled. Refer to Section 20 05 13. A factory mounted NEMA 3R disconnect switch, mounted and wired, shall be provided for each fan.
- C. Direct Drive arrangement shall be AMCA Arrangement 2, utilizing a direct mount coupling connecting the motor shaft and fan impeller shaft. Direct drive Arrangement 4 where the fan wheel is connected directly to the shaft of the motor, the exhaust fan system will require a tight shut-off isolation damper at the fan inlet to allow the fan to be removed for motor replacement. Fan shaft shall be stainless steel.
- D. Fan shaft bearing(s) shall have a key-way, and shall be milled and machine polished stainless steel.
- E. Mechanical shaft seals are to be either neoprene or Teflon (but only when required).
- F.
- G. Sheaves: Fan sheaves shall be of the non-adjustable type.
 1. The motor sheaves shall be Browning Type LVP or MVP cast iron adjustable type with double locking features. Sheaves shall be adjustable as close to 10% above and below the rated fan selection RPM as possible.
 2. Fan sheaves shall be of the non-adjustable type with removable machined bushings and shall be machined on all surfaces. Sheaves shall be cast iron.
- H. Drives: For all exhaust fans requiring 1-1/2 HP or larger motors, the fan drive selection calculations shall be submitted with the fan submittal for review.
- I. Speed Controllers: All direct drive fans shall be furnished with a solid-state speed controller unless otherwise noted. Solid-state speed controllers shall be mounted above the ceiling adjacent to the fan being served or in a NEMA 3R enclosure, mounted next to the roof mounted Fan, when a specific location is not shown.
- J. Curbs: Fan manufacturer shall provide a prefabricated, insulated aluminum roof curb for all roof mounted fans. Curb shall be of welded construction and roof-over-flashing type with build-in cant and overall height of 8" above roof surface, unless otherwise noted. Roof curb shall be equipped to accommodate all types of roofing systems. Coordination with the Architectural Drawings is required. Damper tray shall be provided to facilitate

the mounting of the backdraft dampers. Extended base curbs shall be provided when scheduled or required by applicable codes. Refer also to Section 20 05 48.

- K. All fan factory-run tested and balanced per AMCA 204-05.
- L. All fans shall have L10-100,000 HR bearings rated at operating RPM. Fan shaft bearings shall be ball or roller pillow block type. Bearing(s) shall have extended lube injection lines, Zerk grease fittings and lube relief lines with caps.
- M. Motor, coupling, and bearing shall all be outside the exhaust air pathway.

2.2 CENTRIFUGAL ROOF EXHAUST FANS

- A. Fans shall be direct drive as scheduled. Construction of the fan housing, fan wheel and inlet cone shall be aluminum. Wheels shall be aluminum, backward curved, centrifugal type and shall be statistically and dynamically balanced to assure smooth and vibration-free operation. The entire drive assembly shall be mounted on vibration isolators.
- B. Motor and drives shall be isolated from the exhaust airstream. Motors shall be in accordance with Section 20 05 13. All fans shall bear the AMCA ratings seals for both air flow and sound performance with bird screens in place.
- C. Paint/Battery Storage: Exhaust fans used for the painting or battery storage areas shall have all fan parts exposed to the air stream coated with an epoxy coating. The fan shall be an aluminum non-sparking type, and explosion proof motor.
- D. Fume Hoods: Exhaust fans used for fume hood service shall have all fan parts exposed to the air stream coated with a high temperature acid resistant epoxy coating.
- E. Accessories: Accessories shall include bird screen, gravity backdraft dampers, factory mounted and wired disconnect switch with a conduit through the roof curb for field wiring.

2.3 CENTRIFUGAL UPBLAST EXHAUST FANS

- A. Fans shall be direct driven as scheduled, upblast vertical discharge type. Construction of housing shall be heavy gauge aluminum. The wind band shall have a rolled bead and additional structural members for added strength.
- B. The fan and wheel inlet cone shall be of non-sparking aluminum. Wheel shall be statically and dynamically balanced. Construction shall include a built-in grease drain.
- C. Motor and drives shall be isolated from the exhaust air stream. Refer to Section 20 05 13 for motor requirements. Air for cooling the motor shall be taken into the motor chamber by means of an air tube from a location free of discharge contaminants.
- D. The entire drive assembly and wheel, as a unit, shall be removable through the support structure without dismantling the fan housing. The wheel shaft shall be mounted in heavy-duty ball bearings. The entire drive assembly shall be mounted on rubber vibration isolators.

- E. All fans shall bear the AMCA Certified Ratings seal for both air and sound performance.
- F. Fan Accessories shall include: 1/2" mesh aluminum bird screen. Where required, fans shall be provided with an extended base to conform to NFPA 96 requirements for fan discharge a minimum of 40" above roof. Fan shall be UL listed and labeled for grease removal (UL 762). Provide prefabricated insulated aluminum roof curb & factory mounted disconnect switch (externally mounted on kitchen exhaust fans). Upblast fans used for Kitchen exhaust shall have hinged mount and flexible electrical connection as per NFPA 96.

2.4 FILTERED DOWNBLAST ROOF MOUNTED FAN

- A. Fans shall be direct drive; double width, double inlet, and forward curved centrifugal blower type with the blower assembly mounted on suitable vibration isolators. Drive shall be designed for a minimum of 165% of driven horsepower and shall be furnished with cast iron, adjustable type drive sheaves.
- B. Housing shall be heavy gauge galvanized steel with insulated cover to prevent condensation. Motor hood shall have quick release fasteners to permit servicing of fan and motor. Galvanized steel fan and motor brackets shall mount down inside roof curb to keep overall unit height as low as possible. Fan wheel and fan housing shall be painted with corrosion resistant epoxy.
- C. Accessories shall include 1/2" mesh bird screen, prefabricated insulated aluminum roof curb, damper tray, disconnect switch, gravity backdraft damper.

2.5 CENTRIFUGAL IN-LINE SUPPLY FANS

- A. Fans shall be direct driven in-line type with square heavy gauge galvanized steel housing that shall have a thermally fused epoxy finish. One of the sides shall be hinged and shall support the entire drive assembly and wheel allowing the assembly to swing out for cleaning, inspection, or service without dismantling the unit in any way.
- B. The pillow block ball bearings shall be protected from the airstream by an enclosure. The shaft shall be keyed to both the wheel and pulley.
- C. The fan inlet shall be spun venturi throat overlapped by a backward curved centrifugal wheel with spun cone for maximum performance.
- D. The interior of all in-line fan housings shall have 1" thick, 3 P.C.F. density, and internal sound absorbing fiberglass insulation, to reduce operating noise levels.
- E. Fan accessories shall be as follows: Duct mounted automatic acting gravity type backdraft dampers of same size as fan housing and hanging support isolators with door side perpendicular to mounting surface.

2.6 SIDEWALL PROPELLER FANS

- A. Fans shall be direct driven as scheduled. Blades shall be die-formed and welded to a steel hub. A polished steel fan shaft shall be mounted in permanently lubricated, sealed

pillow block ball bearing. The drive frame assembly shall be formed steel. Fans shall bear AMCA ratings seals for air and sound performances.

- B. Motors shall be as specified in Section 20 05 13.
- C. Accessories shall include mounting collar, disconnect switch, gravity backdraft damper and motor side fan guard.

2.7 AXIAL FANS

- A. Each vane-axial and tube-axial fan shall be of heavy gauge steel with flanged inlet and outlet connections.
- B. Fans shall be direct driven as indicated in the schedule.
- C. Fan shall have all lubrication points accessible at its housing via extended lubrication fittings (Zerk).
- D. Blades shall be individually adjustable. Fans shall be statically and dynamically balanced at the factory.
- E. Direct drive fans shall have TEAO motors with an S.F. of 1.0 and Class F epoxy enameled copper windings, as specified in Section 20 05 13.

2.8 CEILING VENTILATORS

- A. Centrifugal ceiling exhausters shall be designed for ceiling or wall mounting, of type, size, and capacity as scheduled.
- B. Housings shall be galvanized steel lined with acoustical insulation, adaptable for ceiling or wall installation. Provide centrifugal fan wheels mounted on motor shaft with fan shrouds, all removable for service. Provide integral backdraft damper fan discharge.
- C. Motors shall be permanent split-capacitor, permanently lubricated, with grounded cord and plug.
- D. Provide junction box for electrical connection on housing, and receptacle for motor plug-in.
- E. Provide manufacturer's standard roof jacket and transition fittings as indicated on the drawings or scheduled or required.

2.9 AIR CURTAIN FANS (ACF)

- A. General: Air Curtains shall be the direct drive Double Wide Double Inlet (DWDI) centrifugal blower type. The blower housing shall be constructed of heavy gauge galvanized steel. All visible steel components shall be painted with enamel primer and a final coat of enamel.
- B. Access: The Air Curtain shall be easy to install and service. A removable cover shall provide access to the motor and blower assembly by means of removable fasteners.

- C. Motor: A minimum 1/2 HP motor shall be permanently lubricated with automatic thermal overload protection, providing overall low maintenance. See Section 20 05 13 for additional motor requirements.
- D. Air Curtain: Twin blow wheels shall have optimum uniformity of air flow. An adjustable intake louver shall provide easy change of air flow to desired individual preference. Four adjustable nozzle deflector blades shall provide a properly balanced direction of air flow, allowing compensation for draft conditions through open doorways.
- E. Steam Coils: Steam coils shall have double tube construction with inner steam distributing tubes of not less than 3/8" in diameter. Provide directional kinetic orifices suitably spaced to aid condensate removal and uniform steam distribution. Steam coils shall have vertical tubes for freeze protection.
- F. Manufacturers: If they comply with these specifications and requirements, units by one of the following manufacturers will be acceptable: Loren Cook Company, Mars, other approved equal.

2.10 CABINET FANS

- A. Fans shall be designed for ducted installation, of type, size, and capacity as scheduled.
- B. Housings shall be galvanized steel lined with acoustical insulation. Provide centrifugal fan wheels mounted on motor shaft with fan shrouds, all removable for service. Provide integral backdraft damper at fan discharge.
- C. Motors shall be permanent split-capacitor, permanently lubricated, with grounded cord and plug.
- D. Provide junction box for electrical connection on housing, and receptacle for motor plug-in.
- E. Provide transition fittings as indicated on the drawings or scheduled or required.
- F. Fans shall be Cook Gemini series, or approved equal.

2.11 IN-LINE SMOKE EXHAUST FANS

- A. In-line smoke exhaust fans shall be bifurcated single stage exhaust fans. Fans shall be designed to handle hot gases to 500°F including a heat dissipation system to keep the motor cool. Include shaft seals and support clips. Fans shall be approved by the City of Houston for smoke exhaust applications.
- B. Axial fans as specified for non-continuous operation may be used for in-line smoke exhaust fans if designed, constructed and factory certified for continuous operation while exhausting 500°F hot gases.
- C. If they comply with these specifications and requirements, bifurcated fans by one of the following manufacturers will be acceptable: De Bothezat Bifurcator, Strobic Air, or other approved equal.

2.12 ROOF SMOKE EXHAUST FANS (CURB MOUNTED)

- A. Smoke exhaust fans shall be Greenheck Model TAUB-HT or approved equal. Fan shall be upblast discharge. Fan shall be designed to operate continuously while exhausting 500°F gas. Motor shall be located in a separate compartment that is force ventilated with outside air. Fans shall be approved by City of Houston for smoke exhaust applications

2.13 CENTRIFUGAL TYPE UTILITY FANS

- A. Centrifugal type exhaust fans shall be single width, single inlet and shall have fan blades that are either forward or backward curved.
- B. Wheels shall be of riveted or spot-weld construction with steel rims and hub plates. Blades shall be die cut and die formed. Hubs shall be machined close-grained cast iron.
- C. Housing shall be steel with lock seam construction and beaded discharge reinforcement. Housings shall be of the adjustable type with continuous inlet collars. Units exposed to weather shall be complete with weatherproof enclosure for motor and drive.
- D. Fan shafts shall be solid turned and polished C1040 steel with rust resistant coating.
- E. Unless otherwise indicated on the Drawings, sheaves shall be in overhanging position. Motors shall be mounted on slide rail bases.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Submittals shall include, but not be limited to, the following:
 - 1. AMCA ratings for both sound and air performance.
 - 2. Performance curves with selection point clearly indicated.
 - 3. Specific sound power levels radiated and radiated sound power levels at design operating conditions for each unit. Plot these on an NC criteria curve. Unit discharge noise levels at design operating condition.
 - 4. Motor data as required in Section 20 05 13.
 - 5. Catalog cut sheets clearly indicating sizes, model numbers and accessories.
 - 6. Additional information as required by Section 20 05 03, Basic Division 20-28 Requirements.
 - 7. Roof mounted fan support analysis as per 200505, 3.17, B.

3.2 INSTALLATION

- A. All fans mounted on roof curbs shall be securely attached to the roof curb with appropriate fasteners located no more than 8 inches on center with a minimum of two fasteners per side. The roof curb shall be securely attached to the building structure. Refer to section 200505, 3.17, B for requirements related to wind loading.

- B. Furnish and coordinate all roof mounted fan curb openings prior to roofing installations.
- C. All fans with 2000 cfm or greater airflow shall have a duct smoke detector to shut down the fan upon detection of smoke. Where the building is equipped with a fire alarm system, the detector shall be supervised by that system. For smoke control and other emergency systems, the fan shall not shut down but there shall be a remote indication that smoke was detected.
- D. Refer to Section 23 05 93 for Balancing Requirements, Section 20 05 48 for Vibration Isolation and Section 23 09 16.

END OF SECTION

SECTION 23 36 00

AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. Furnish and install air terminal units as shown, scheduled, and specified including, but not limited to:
 - 1. Series fan powered terminal units (FPTU) with and without heating coils.
 - 2. Parallel fan powered terminal units (FPTU) with and without heating coils.
 - 3. Single duct variable volume terminal units
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Safety and Disconnect Switches - Section 26 28 16.16
 - 2. Fuses - Section 26 28 13

1.3 QUALITY ASSURANCE

- A. Basis: Titus Series QFPC, ESV-3000 and EDV-3000 are the basis of design for size, selection, performance, and sound criteria.
- B. Manufacturer's: If they comply with these specifications, air terminal units manufactured by one of the following manufacturers will be acceptable:
 - 1. Nailor
 - 2. Krueger
 - 3. Titus
 - 4. Price Industries
 - 5. Metalaire

- C. Laboratory Tests: Each size of each unit to be used on this project shall be completely tested and certified by AHRI. The unit manufacturer shall submit complete details, brochures, instrumentation information, etc., for review.
- D. Performance Certification: Provide manufacturer's and independent test lab's certification of test results, signed by an authorized officer of the company. All units shall bear the AHRI label.
- E. Safety Testing: Terminals shall also be either UL or ETL listed per UL 1995 "Heating & Cooling Equipment" as applicable.

PART 2 - PRODUCTS

2.1 FAN POWERED TERMINAL UNITS (FPTU) - SERIES

- A. General: Provide series constant volume, pressure independent fan-powered terminal units consisting of a sheet metal housing with a flow sensor, control damper, damper operator, fan assembly, heating coil (where scheduled), and flow controls. Fan powered terminal units shall be compatible with the temperature controls and damper operators as specified in Section 25 09 16, Building Controls and Automation System. Terminal unit capacities and sizes shall be as scheduled and shown on the Drawings. The entire terminal unit including the heating coil shall be designed and built as a single unit. The unit shall be provided with a primary variable air volume damper that controls the air quantity in response to a room sensor. The unit shall also contain a fan and motor assembly and an electric or hot water heating coil where scheduled. The coil shall be located in the discharge of the blower section and be easily removed for servicing. The space limitations shall be reviewed carefully to ensure all units will fit into the space allowed. Heaters shall not be located on the induction port.
- B. Casing: Unit casing shall be minimum 20-gauge galvanized steel.
- C. Insulation: Unit shall be fully lined with at least 3/4" thick dual density fiberglass insulation. Dual density insulation shall have 1/8", 4-pound density on the air stream side, and 5/8", 1.2-pound density on the casing side. The fiberglass shall comply with U.L. Standard 181 for erosion and NFPA 90A for fire resistivity. Any cut edges of fiberglass exposed to the moving air stream shall be coated to prevent erosion with an NFPA 90A approved mastic for fire resistivity. Mastic shall contain an immobilized EPA-approved anti-microbial agent to inhibit potential microbial growth.
- D. Access: All control box covers, and access doors shall have quick acting type latches which allow for setting of controls and servicing of the unit without disturbing duct connections. Access panels shall be available for servicing or removing the fan or motor without disturbing duct connections.
- E. Duct Connections: Unit casing shall have round or oval duct collars on the primary air inlet connection (2000 fpm maximum velocity) and rectangular supply air outlet for slip and drive connection to sheet metal ductwork (1500 fpm maximum velocity). All components including all controls (except the room sensors) and all wiring shall be factory installed and mounted within the unit.

- F. Flow Sensor: Terminal unit shall incorporate a multipoint flow sensor with a minimum number of four pick-up points connected to an averaging chamber to ensure the following performance: Controller fidelity shall be plus or minus 5% of set volume with any flex inlet configuration and inlet static variation of 0.5 inches W.G. to 6.0 inches W.G. Flow measuring taps and a flow chart shall be supplied and mounted on each unit for field balancing air flows.
- G. Operation: Terminal units shall be capable of operation as described in Section 25 09 93, Sequence of Operation, and Section 23 09 33, Input/Output Point Schedule with inlet static pressures of 0.10 to 3.0 inches W.G. at full cooling with no mixing of induced and primary air.
- H. Fan/Motor: Fan motor assembly shall be forward curved centrifugal fan with a direct drive motor. Motors shall be ECM variable-speed, DC, brushless motors specifically designed for use with single phase, 277V, 60 Hz electrical input. Motor shall be complete with and operated by a single-phase integrated controller/inverter that operates the wound stator and senses rotor position to electronically commutate the stator. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero rotor losses. Motor shall have built-in soft start and soft speed change ramps. Motor shall be able to be mounted with shaft in horizontal or vertical orientation. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of 65% efficiency over its entire operating range. Provide manual (or optional remote) fan speed output control for field adjustment of the fan airflow setpoint. Inductors shall be provided to minimize harmonic distortion and line noise. Provide isolation between fan motor assembly and unit casing to eliminate any vibration from the fan to the terminal unit casing. Provide a motor that is designed to overcome reverse rotation and not affect life expectancy. Provide five (5) year terminal unit manufacturer warranty on ECM motor and related controller. If they comply with this specification, motors manufactured by Emerson, General Electric, Fasco or Nailor Industries "EPIC" will be acceptable.
- I. Air Volume Adjustment: The manufacturer of the fan powered terminal units shall factory set the fan discharge volume indicated in the schedule and/or on the Drawings for terminal units, which operate at constant fan discharge volume. If the fan powered terminal unit manufacturer cannot accurately factory set the fan volume for constant speed fans and the cfm needs to be readjusted or tuned during the air distribution outlet field balancing procedure, the fan powered terminal unit manufacturer shall send factory technicians to the project site to adjust the ECM motor and the terminal unit manufacturer's micro-processor/pwm controller to the fan discharge volume indicated in the Schedules in the Contract Documents at no additional cost to the Owner. Fan discharge volume shall be accurate within $\pm 5\%$ regardless of changes in static upstream or downstream of the terminal unit after it is installed in the field. Fan cfm is to be set with a set screw or digital meter. The terminal unit manufacturer shall provide calibration chart correlating fan cfm to voltage input to the microprocessor/pwm device. Neither SCR's nor rheostats shall be an acceptable means of setting the fan cfm. One (1) speed adjustment device shall be provided by the terminal unit manufacturer to the Owner for the field adjustment of the fan speed should construction or design changes become necessary. The factory settings for fan discharge volume shall be clearly marked on each terminal unit identification label.

- J. Control Damper: Primary air damper shall be opposed blade, single blade elliptical, or single blade round shape. Blades shall be a minimum of two formed opposed pieces of 24-gauge galvanized steel or one 16-gauge galvanized blade with heavy duty extruded neoprene gasket mechanically fastened at the blade edge to seal off air leakage so as to not exceed 2% of scheduled maximum air flow CFM at 3" of inlet static pressure. Blade shaft shall pivot on corrosion free nylon bearings.
- K. Accessories: Each fan powered package shall have a start/stop relay for connection to the BCAS, and 277-volt Class II control power transformer with built-in fusing to serve the terminal unit controller. The by-pass air inlet(s) shall include a holding frame and filter. Filters shall be removed after construction and prior to final balancing. Provide two sets of filters.
- L. Electrical Connections: Provide fan powered terminal units designed for single electrical power feed and complying with all applicable NEC and UL requirements and all other applicable Codes and Standards. Provide unit-mounted fused disconnect switches with factory wiring from the load side of the disconnect switch to the fan motor and electric heating coil. The only field wiring shall be to the line side of the disconnect switch. Refer to Division 26 for fuse and disconnect specifications. Fuses shall be sized for a nominal 125% of full load amperes of the load served.
- M. Electric Heating Coil:
1. Electric heating coils shall be provided of the capacity shown on the drawings.
 2. Units with heaters shall be U.L. or ETL listed for zero clearance and shall bear the proper listing mark and label. Each heater shall meet all requirements of the National Electrical Code.
 3. Each heater terminal box and frame shall be constructed of minimum 20-gauge corrosion resistant metal. Heating elements shall be constructed of high-grade nickel/chromium wire and shall not glow when operating at the rated quantities.
 4. Heaters shall be provided with factory supplied and prewired branch circuit fusing as required by NEC and U.L.
 5. Main power connections to be supplied integral with each unit by the terminal manufacturer to break all ungrounded conductors. All units shall have door interlocked fused disconnect switch.
 6. Electric heating coil shall be removable without disturbing the duct system.
 7. Each 277-volt heater shall be complete with:
 - a. Primary thermal cutoff to de-energize the heater in case of overheating.
 - b. Differential air pressure switch or current transducer relay.
 - c. Electric switches as required for staging.
- N. Hot Water Heating Coils:
1. Coils shall be AHRI certified with aluminum plate or spiral fins having a maximum of 11 fins per inch bonded to the copper tubes by means of mechanical expansion. No soldering or tinning shall be used in the bonding process. Coil tubing shall be 5/8" diameter, 0.035" wall copper tube with minimum 0.010" aluminum fins. Coils shall be provided with manual air vents and drain valves. Hot water coils shall be minimum 2 rows.
 2. Coils shall be factory pressure tested under water at 225 psig with air.

3. Coil face velocities shall not exceed 500 fpm and air pressure drop shall not exceed 0.25" w.g. at the scheduled maximum airflow.
4. Water pressure drop through coils shall not exceed 15 feet.

O. Controls:

1. Fans, pressure independent volume controls and heater controls shall be factory-installed, including a multipoint air flow sensor for inlet air volume measurement, a Titus II Flow Logic Analyzer, Krueter multi-functioning controller, or equal, an adjustable fan control P/E Switch, adjustable heater stage P/E Switches, or a DDC terminal unit controller and related accessories and components. Controls shall be pneumatic, electric, or DDC as required by the sequences specified in Section 23 09 93, Sequence of Operation. Controls shall provide adjustable minimum and maximum cfm limits, adjustable throttling range, and a constant throttling range option. Adjustments for control settings and gauge taps for flow measurement and balancing shall be easily accessible.
2. Where required, DDC controllers and damper operators shall be furnished by the BCAS Contractor for factory installation, wiring and testing by the terminal unit manufacturer. Controllers shall be located for easy access from the ceiling below the unit. DDC units shall be preset and configured at the factory in which it was manufactured, ready for terminal manufacturer to mount.
3. Temperature control functions and sequences shall be as specified in Section 23 09 93, Sequence of Operation, Section 23 09 33, Input/Output Point Schedule, and as shown on the Drawings.

2.2 FAN POWERED TERMINAL UNITS (FPTU) - PARALLEL

- A. General: Provide variable volume, pressure independent, parallel intermittent fan operation, fan-powered terminal units consisting of a sheet metal housing with a flow sensor, control damper, damper operator, fan assembly, heating coil (where scheduled), and flow controls. Fan powered terminal units shall be compatible with the temperature controls and damper operators as specified in Section 23 09 16 Building Controls and Automation System. Terminal unit capacities and sizes shall be as scheduled and shown on the Drawings. The entire terminal unit including the heating coil shall be designed and built as a single unit. The unit shall be provided with a primary variable air volume damper that controls the air quantity in response to a room sensor. The unit shall also contain a fan and motor assembly and an electric or hot water heating coil where scheduled. The coil shall be located in the return air inlet and be easily removed for servicing. The space limitations shall be reviewed carefully to ensure all units will fit into the space allowed.
- B. Casing: Unit casing shall be minimum 20-gauge galvanized steel.
- C. Insulation: Unit shall be fully lined with at least 3/4" thick dual density fiberglass insulation. Dual density insulation shall have 1/8", 4-pound density on the air stream side, and 5/8", 1.2-pound density on the casing side. The fiberglass shall comply with U.L. Standard 181 for erosion and NFPA 90A for fire resistivity. Any cut edges of fiberglass exposed to the moving air stream shall be coated to prevent erosion with an NFPA 90A approved mastic for fire resistivity. Mastic shall contain an immobilized EPA-approved anti-microbial agent to inhibit potential microbial growth.

- D. Access: All control box covers, and access doors shall have quick acting type latches which allow for setting of controls and servicing of the unit without disturbing duct connections. Access panels shall be available for servicing or removing the fan or motor without disturbing duct connections.
- E. Duct Connections: Unit casing shall have round or oval duct collars on the primary air inlet connection (2000 fpm maximum velocity) and rectangular supply air outlet for slip and drive connection to sheet metal ductwork (1500 fpm maximum velocity). All components including all controls (except the room sensors) and all wiring shall be factory installed and mounted within the unit.
- F. Flow Sensor: Terminal unit shall incorporate a multipoint flow sensor with a minimum number of four pick-up points connected to an averaging chamber to ensure the following performance: Controller fidelity shall be plus or minus 5 percent of set volume with any flex inlet configuration and inlet static variation of 0.5 inches W.G. to 6.0 inches W.G. Flow measuring taps and a flow chart shall be supplied and mounted on each unit for field balancing air flows.
- G. Operation: Terminal units shall be capable of operation as described in Section 23 09 93, Sequence of Operation, and Section 23 09 33, Input/Output Point Schedule with inlet static pressures of 0.10 to 3.0 inches W.G. at full cooling with no mixing of induced and primary air.
- H. Control Damper: Primary air damper shall be opposed blade, single blade elliptical, or single blade round shape. Blades shall be a minimum of two formed opposed pieces of 24-gauge galvanized steel or one 16-gauge galvanized blade with heavy duty extruded neoprene gasket mechanically fastened at the blade edge to seal off air leakage so as to not exceed 2% of scheduled maximum air flow CFM at 3" of inlet static pressure. Blade shaft shall pivot on corrosion free nylon bearings.
- I. Accessories: Each fan powered package shall have a start/stop relay for connection to the BCAS, and 277-volt Class II control power transformer with built-in fusing to serve the terminal unit controller. The by-pass air inlet(s) shall include a holding frame and filter. Filters shall be removed after construction and prior to final balancing. Provide two sets of filters.
- J. Electrical Connections: Provide fan powered terminal units designed for single electrical power feed and complying with all applicable NEC and UL requirements and all other applicable Codes and Standards. Provide unit-mounted fused disconnect switches with factory wiring from the load side of the disconnect switch to the fan motor and electric heating coil. The only field wiring shall be to the line side of the disconnect switch. Refer to Division 26 for fuse and disconnect specifications. Fuses shall be sized for a nominal 125% of full load amperes of the load served.
- K. Electric Heating Coil:
 - 1. Electric heating coils shall be provided of the capacity shown on the drawings.
 - 2. Units with heaters shall be U.L. or ETL listed for zero clearance and shall bear the proper listing mark and label. Each heater shall meet all requirements of the National Electrical Code.

3. Each heater terminal box and frame shall be constructed of minimum 20-gauge corrosion resistant metal. Heating elements shall be constructed of high-grade nickel/chromium wire and shall not glow when operating at the rated quantities.
4. Heaters shall be provided with factory supplied and prewired branch circuit fusing as required by NEC and U.L.
5. Main power connections to be supplied integral with each unit by the terminal manufacturer to break all ungrounded conductors. All units shall have door interlocked fused disconnect switch.
6. Electric heating coil shall be removable without disturbing the duct system.
7. Each 277-volt heater shall be complete with:
 - a. Primary thermal cutoff to de-energize the heater in case of overheating.
 - b. Differential air pressure switch or current transducer relay.
 - c. Electric switches as required for staging.

L. Hot Water Heating Coils:

1. Coils shall be AHRI certified with aluminum plate or spiral fins having a maximum of 11 fins per inch bonded to the copper tubes by means of mechanical expansion. No soldering or tinning shall be used in the bonding process. Coil tubing shall be 5/8" diameter, 0.035" wall copper tube with minimum 0.010" aluminum fins. Coils shall be provided with manual air vents and drain valves. Hot water coils shall be minimum 2 rows.
2. Coils shall be factory pressure tested under water at 225 psig with air.
3. Coil face velocities shall not exceed 500 fpm and air pressure drop shall not exceed 0.25" w.g. at the scheduled maximum airflow.
4. Water pressure drop through coils shall not exceed 15 feet.

M. Controls:

1. Fans, pressure independent volume controls and heater controls shall be factory-installed, including a multipoint air flow sensor for inlet air volume measurement, and a DDC terminal unit controller and related accessories and components. Controls shall be DDC as required by the sequences specified in Section 23 09 93, Sequence of Operation. Controls shall provide adjustable minimum and maximum cfm limits, adjustable throttling range and a constant throttling range option. Adjustments for control settings and gauge taps for flow measurement and balancing shall be easily accessible.
2. Where required, DDC controllers and damper operators shall be furnished by the BCAS Contractor for factory installation, wiring and testing by the terminal unit manufacturer. Controllers shall be located for easy access from the ceiling below the unit. DDC units shall be preset and configured at the factory in which it was manufactured, ready for terminal manufacturer to mount.
3. Temperature control functions and sequences shall be as specified in Section 23 09 93, Sequence of Operation, Section 23 09 33, Input/Output Point Schedule, and as shown on the Drawings.

2.3 VARIABLE AIR VOLUME (VAV) TERMINAL UNITS

- A. General: Furnish and install HVAC terminal units consisting of a casing with a flow sensor, control damper, damper operator, and flow controls. VAV terminals units shall be compatible with temperature controls as specified in Section 23 09 16.
- B. Casing: Unit casing shall be minimum 22-gauge galvanized steel. Casing leakage shall not exceed 2.0% of scheduled design CFM at 3.0" WC interior casing pressure. All casing joints shall be sealed with approved adhesive if required to meet the maximum casing leakage rate.
- C. Insulation: Unit shall be fully lined with at least 3/4" thick dual density fiberglass insulation. Dual density insulation shall have 1/8", 4-pound density on the air stream side, and 5/8", 1.2-pound density on the casing side. The fiberglass shall comply with U.L. Standard 181 for erosion and NFPA 90A for fire resistivity. Any cut edges of fiberglass exposed to the moving air stream shall be coated to prevent erosion with an NFPA 90A approved mastic for fire resistivity. Mastic shall contain an immobilized EPA-approved anti-microbial agent to inhibit potential microbial growth.
- D. Control Damper: Primary air damper shall be opposed blade, single blade elliptical, or single blade round shape. Blades shall be a minimum of two formed opposed pieces of 24-gauge galvanized steel or one 16-gauge galvanized blade with heavy duty extruded neoprene gasket mechanically fastened at the blade edge to seal off air leakage so as to not exceed 2% of scheduled maximum air flow CFM at 3" of inlet static pressure. Blade shaft shall pivot on corrosion free nylon bearings.
- E. Damper Operator: Damper operator shall be electric type sized as required to operate the specific damper and suitable for use with the specified DDC controls. Damper operator shall be factory mounted and adjusted.
- F. Terminal unit shall be provided with DDC controls to provide pressure independent VAV temperature control. Controls shall consist of a casing mounted volume regulator and an air stream mounted flow sensor.
- G. Flow Sensor: Terminal unit shall incorporate a multipoint flow sensor with a minimum number of four pick-up points connected to an averaging chamber to ensure the following performance: Controller fidelity shall be plus or minus 5 percent of set volume with any flex inlet configuration and inlet static variation of 0.5 inches W.G. to 6.0 inches W.G. Flow measuring taps and a flow chart shall be supplied and mounted on each unit for field balancing air flows.
- H. Where required, DDC controllers and damper operators shall be furnished by the BCAS Contractor for factory installation, wiring and testing by the terminal unit manufacturer. Controllers shall be located for easy access from the ceiling below the unit. DDC units shall be preset and configured at the factory in which it was manufactured, ready for terminal manufacturer to mount.
- I. Temperature control functions and sequencing shall be as specified in Section 23 09 93, Sequence of Operation.

PART 3 - EXECUTION

3.1 SUBMITTAL

- A. Shop drawing submittal shall include, but not be limited to, the following:
1. Catalog cut sheets on each terminal unit, clearly marked to show sizes, configuration, construction, features, controls, clearances, accessories, performance data, sound data, operating sequence, and other pertinent information.
 2. Data and catalog cut sheets for insulation, adhesives, etc.
 3. Air control damper and fan curves or charts, which clearly show damper and fan performance.
 4. Performance characteristics for each terminal unit.
 5. Airflow sensor calibration curves for each type and size terminal unit.
 6. Wiring and control diagrams.
 7. Copies of current AHRI Directory listings as applicable.
 8. Maximum Overcurrent Protection (MOCP)
 9. Minimum Circuit Ampacity (MCA)
 10. Motor data as required in Section 20 05 13 and herein.
 11. Additional information as required in Section 20 05 03.

3.2 INSTALLATION

- A. Terminal units shall be installed as shown on the Drawings and per manufacturer's recommendations. All terminal units shall be rigidly suspended at all four corners with duct strap.
- B. The inlet duct(s) to each terminal unit shall be a minimum length of three (3) duct diameters of straight duct. The contractor shall provide an inlet transition piece from the inlet duct size shown on the Drawings to the terminal unit inlet size with maximum of 12 inches in length without flexible connection.
- C. Refer to Section 23 05 93 for Balancing Requirements, Section 25 09 16, Building Control and Automation System Software and Programming, Section 23 09 93, Sequence of Operation, and Section 23 09 33, Input/Output Point Schedules.

END OF SECTION

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SECTION 23 41 10

AIR FILTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. General Division 20-28 Materials and Methods - Section 20 05 05
 - 3. Schedule of Submittal Data - 20 05 04
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. Furnish and install air-filtering material as specified herein and where shown on the Drawings. Provide three sets of filter media for each air handling unit filter bank.
- B. Types of air cleaning equipment specified in this Section include the following:
 - 1. Air Filters:
 - a. Throwaway
 - b. Medium and high efficiency extended surface
 - c. HEPA
 - d. Carbon
 - e. Paint Arrestor Media
 - 2. Filter Holding Systems:
 - a. Side servicing housings
 - b. Holding devices for built-up banks
 - 3. Filter Gauges.

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. American Air filter
 - 2. Camfil Farr
 - 3. Flanders

B. Codes and Standards

1. NFPA Compliance: Comply with applicable portions of NFPA 90A and 90B, and NEC pertaining to installation of air filters and associated electric wiring and equipment.
2. UL Compliance: Comply with UL Standards pertaining to safety and performance of air filter units.
3. ASHRAE Compliance: Comply with provisions of ASHRAE Standards 52.2-2017, for method of testing, and for recording and calculating air flow rates.

PART 2 – PRODUCTS

Refer to mechanical schedules for filter requirements. At minimum, Contractor to provide MERV 11 filter for all HVAC equipment unless otherwise specifically noted.

2.1 TYPE 1 - 15% EFFICIENCY FILTERS

- A. General: Flat unit filters shall be furnished complete with replaceable type media installed in frames. Frames shall be constructed of 26 gauge steel. Frames shall be provided with latches or hinged access doors for easy removal of filter media. To prevent the bypassing of air, frames shall be gasketed complete on all sides. All filter sizes shall be of sizes that are "in stock" locally. Thickness shall be 2". Media face velocity shall not exceed 500 feet per minute at the scheduled fan cfm.
- B. Filter Media: The filter media shall have a minimum efficiency of 15% based upon the ASHRAE Standard 52.1 "dust Spot Test".
- C. Anti-Microbial Coating: Filter media shall be finished with a factory applied, immobilized, EPA-approved anti-microbial agent to inhibit potential microbial growth. Results of mold, fungi, and bacteria testing of UL 181, ASTM C1071, ASTM G-21, and G-22 shall show no growth. Anti-microbial agent shall be Interface Research Corporation 'Intersept' or approved equal.

2.2 TYPE 2 - MERV 8 (30-35% EFFICIENCY) FILTERS

- A. General: Air filters shall be 2" thick, medium efficiency, pleated and of the replaceable/disposable type. Each filter shall consist of lofted non-woven cotton and synthetic media, support grid and enclosing frame. The filter shall be listed by Underwriters' Laboratories as Class 2, equal to Camfil Farr 30/30.
- B. Filter Media: Filter media shall have a minimum efficiency reporting value of MERV 8 when tested in accordance with ASHRAE Test Standard 52.2. Filter face area shall contain not less than 15 pleats per linear foot. Initial resistance at 500 fpm shall not exceed 0.31" w.g.
- C. Anti-Microbial Coating: Filter media shall be finished with a factory applied, immobilized, EPA-approved anti-microbial agent to inhibit potential microbial growth. Results of mold, fungi, and bacteria testing of UL 181, ASTM C1071, ASTM G-21, and G-22 shall show

no growth. Anti-microbial agent shall be Interface Research Corporation 'Intersept' or approved equal.

- D. Media Support Grid: Grid shall be welded wire with an open area of not less than 96%. Grid shall be bonded to the media to eliminate oscillation and pull away. The grid shall be formed to effect a radial pleat, allowing total use of media.
- E. Enclosing Frame: The frame shall be a rigid, high wet-strength beverage board, with diagonal support members bonded to the air entering and air exiting side of each pleat. The enclosing frame shall be chemically bonded to the filter pack.

2.3 TYPE 3 - MERV 11 (60-65% EFFICIENCY) FILTERS

- A. General: Air filters shall be high performance, deep pleated, totally rigid, totally disposable type, 12" thick. Filters shall be listed by Underwriters' Laboratories as Class 1 or 2. Each filter shall consist of high density media, media support grid, contour stabilizers, diagonal support bracing and enclosing frame.
- B. Filter Media: Filter media shall be of high density microfine glass fibers which are laminated to a non-woven synthetic backing to form a lofted filter blanket. The filter media shall have a minimum efficiency reporting value of MERV 11 when tested in accordance with ASHRAE Test Standard 52.2. Initial resistance at 500 fpm shall not exceed 0.41" w.g.
- C. Anti-Microbial Coating: Filter media shall be finished with a factory applied, immobilized, EPA-approved anti-microbial agent to inhibit potential microbial growth. Results of mold, fungi, and bacteria testing of UL 181, ASTM C1071, ASTM G-21, and G-22 shall show no growth. Anti-microbial agent shall be Interface Research Corporation 'Intersept' or approved equal.
- D. Media Support Grid: The media support shall be a welded wire grid with an effective open area of not less than 96%. The welded wire grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pullaway. The media support grid shall be formed in such a manner that it affects a tapered radial pleat design. The grid shall be designed to support the media both vertically and horizontally.
- E. Contour Stabilizers: Contour stabilizers shall be galvanized steel and shall be permanently installed on both the air entering and air exiting sides of the filter media pack to ensure that the tapered radial pleat configuration is maintained throughout the life of the filter. The filter shall be capable of withstanding 10" w.g. pressure drop without noticeable distortion of the media pack.
- F. Enclosing Frame: The enclosing frame shall be constructed of galvanized steel. It shall be assembled in such a manner that a rigid and durable enclosure for the filter pack is affected. The media pack shall be mechanically and chemically bonded to the inside periphery of the enclosing frame, thus eliminating the possibility of air bypass. The enclosing frame shall be equipped with galvanized steel protective diagonal support braces on both the air entering and air exiting sides of the filters. The diagonal support braces shall be mechanically fastened to each contour stabilizer.

2.4 TYPE 3 - MERV 13 (80-85% EFFICIENCY) FILTERS

- A. General: Air filters shall be high performance, deep pleated, totally rigid, totally disposable type, 12" thick. Filters shall be listed by Underwriters' Laboratories as Class 1 or 2. Each filter shall consist of high-density media, media support grid, contour stabilizers, diagonal support bracing and enclosing frame.
- B. Filter Media: Filter media shall be of high density microfine glass fibers which are laminated to a non-woven synthetic backing to form a lofted filter blanket. The filter media shall have a minimum efficiency reporting value of MERV 13 when tested in accordance with ASHRAE Test Standard 52.2. Initial resistance at 500 fpm shall not exceed 0.41" w.g.
- C. Anti-Microbial Coating: Filter media shall be finished with a factory applied, immobilized, EPA-approved anti-microbial agent to inhibit potential microbial growth. Results of mold, fungi, and bacteria testing of UL 181, ASTM C1071, ASTM G-21, and G-22 shall show no growth. Anti-microbial agent shall be Interface Research Corporation 'Intersept' or approved equal.
- D. Media Support Grid: The media support shall be a welded wire grid with an effective open area of not less than 96%. The welded wire grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pullaway. The media support grid shall be formed in such a manner that it affects a tapered radial pleat design. The grid shall be designed to support the media both vertically and horizontally.
- E. Contour Stabilizers: Contour stabilizers shall be galvanized steel and shall be permanently installed on both the air entering and air exiting sides of the filter media pack to ensure that the tapered radial pleat configuration is maintained throughout the life of the filter. The filter shall be capable of withstanding 10" w.g. pressure drop without noticeable distortion of the media pack.
- F. Enclosing Frame: The enclosing frame shall be constructed of galvanized steel. It shall be assembled in such a manner that a rigid and durable enclosure for the filter pack is affected. The media pack shall be mechanically and chemically bonded to the inside periphery of the enclosing frame, thus eliminating the possibility of air bypass. The enclosing frame shall be equipped with galvanized steel protective diagonal support braces on both the air entering and air exiting sides of the filters. The diagonal support braces shall be mechanically fastened to each contour stabilizer.

2.5 TYPE 7 - SIDE ACCESS HOUSING (LOW EFFICIENCY FILTER)

- A. General: Side access, single-stage filter system consisting of a housing, access doors, tracks, and universal holding frames. Housing shall accommodate filters up to 6" deep with a minimum efficiency reporting value of MERV 8, in accordance with ASHRAE 52.2. In-line depth shall not exceed 12".
- B. Leakage at rated airflow, upstream to downstream of filter, holding frame, and slide mechanism shall be less than 1% at 3" w.g. differential.
- C. Leakage into housing from ambient atmosphere at rated airflow shall be less than 0.5% at 3" w.g. negative. Manufacturer shall submit substantiating test reports.

- D. Housings shall be similar and approved equal to Camfil-Farr model 4P Glide/Pack. They shall be factory fabricated and assembled of 16-gauge galvanized steel with corner posts for Z-channel bracing to eliminate racking. Each housing shall be equipped with two (2) access doors and 1.5" standing flanges with pre-punched holes to facilitate field installation and/or in-line mating with other housings. Flanges shall be notched to provide water runoff. Housings must be weatherproof and suitable for rooftop/outdoor installation.
- E. Access doors shall be constructed of 16-gauge galvanized steel and positioned to facilitate removal and replacement of filters from either side of the housing. Each door shall be equipped with adjustable and replaceable positive sealing latches and replaceable hinges. The peripheral gasket material shall be of high memory sponge neoprene. Holding frame to door contact shall be gasketed with 1" x 1.25" polyurethane foam to affect a leak proof seal.
- F. Tracks shall be field adjustable and replaceable, heavy gauge, anodized aluminum extrusion designed to accommodate universal holding frames. Each extrusion shall be equipped with a replaceable, non-woven pile encased, aluminum backed, polypropylene finned seal providing an air barrier between the extrusion and universal holding frame.
- G. Universal holding frames shall be constructed of galvanized steel and equipped with integral U-Bearing slide channels, centering dimples, multiple fastener lances and polyurethane foam gasketing, internally and on frame sides, to facilitate a sealable side access system capable of accommodating any standard (nominal) 24" x 24" or 12" x 24" filters without modification to frame or housing.
- H. Outdoor Unit Insulation: Housings shall be completely insulated. Construction shall be double walled, 16-gauge galvanized steel, stitch welded to enclose insulation for complete isolation from airstream and improved "K" factor. Insulation shall be thermal, acoustical glass fiber, 1" thick with a thermal conductivity of 0.25 to 0.30 K and a bond strength of 20 PSF, based on S-08B modified. It shall withstand 250°F, meet hazard standards of NFPA 90A, and be tested in accordance with ASTM-E84. Flame spread rating shall be 25 with a maximum smoke development of 50. Units shall be phosphatized and prime coated with zinc chromate.

2.6 TYPE 8 - SIDE ACCESS HOUSING (FINAL FILTERS)

- A. General: Side access, two-stage filter system consisting of a housing, access doors, tracks, universal holding frames and integral static tap. Housing shall accommodate final filters with efficiencies of MERV 11, MERV 13, and MERV 14, ASHRAE 52.2. In-line depth shall not exceed 21".
- B. The static tap shall be constructed of brass and equipped with pneumatic fittings. It shall be installed between the pre-filter and final filter sections for individual pressure drop readings.
- C. Leakage at rated airflow, upstream to downstream of filter, holding frame, and slide mechanism shall be less than 1% at 3" w.g. differential.

- D. Leakage into housing from ambient atmosphere at rated airflow shall be less than 0.5% at 3" w.g. negative. Manufacturer shall submit substantiating test reports.
- E. Housings shall be similar and approved equal to Camfil-Farr model 3P Glide/Pack. They shall be factory fabricated and assembled of 16-gauge galvanized steel with corner posts of Z-channel bracing to eliminate racking. Each housing shall be equipped with two (2) access doors and 1.5" standing flanges with pre-punched holes to facilitate field installation and/or in-line mating with other housings. Flanges shall be notched to provide water runoff. Housings must be weatherproof and suitable for rooftop/outdoor installation.
- F. Access doors shall be constructed of 16-gauge galvanized steel and positioned to facilitate removal and replacement of filters from either side of the housing. Each door shall be equipped with adjustable and replaceable positive sealing latches and replaceable hinges. The peripheral gasket material shall be of high memory sponge neoprene. Holding frame-to-door contact shall be gasketed with 1" x 1.25" polyurethane foam to affect a leak proof seal.
- G. Tracks shall be field adjustable and replaceable, heavy gauge, anodized aluminum extrusion designed to accommodate universal holding frames. Each extrusion shall be equipped with a replaceable, non-woven pile encased, aluminum backed, polypropylene finned seal providing an air barrier between the extrusion and universal holding frame.
- H. Universal holding frames shall be constructed of galvanized steel and equipped with integral U-Bearing slide channels, centering dimples, multiple fastener lances and polyurethane foam gasketing, internally and on frame sides, to facilitate a sealable side access system capable of accommodating any standard (nominal) 24" x 24" or 12" x 24" filters without modification to frame or housing.
- I. Outdoor Unit Insulation: Housings shall be completely insulated. Construction shall be double walled, 16-gauge galvanized steel, stitch welded to enclose insulation for complete isolation from airstream and improved "K" factor. Insulation shall be thermal, acoustical glass fiber, 1" thick with a thermal conductivity of 0.25 to 0.30 K and a bond strength of 20 PSF, based on S-08B modified. It shall withstand 250°F, meet hazard standards of NFPA 90A, and be tested in accordance with ASTM-E84. Flame spread rating shall be 25 with a maximum smoke development of 50. Units shall be phosphatized and prime coated with zinc chromate.

2.7 TYPE 11 - UNIVERSAL HOLDING FRAMES FOR 2" FILTERS (BUILT-UP BANKS)

- A. Universal holding frames shall be similar and approved equal to Camfil-Farr Type 8 Universal Holding Frames constructed of not less than 16-gauge, welded, galvanized steel. They shall be equipped with polyurethane foam gaskets, fasteners and filter centering dimples. The four sealing flange corners shall be flush mitered and secured in order to form a uniform sealing and gasketing surface. The in-line depth shall be not less than 2.69" in order to effect adequate bearing surface for built-up filter banks. Filter fasteners shall be capable of being installed without the requirement of tools, nuts or bolts. The universal holding frame shall be designed to accommodate standard size filters with the application of the appropriate type fastener.

2.8 TYPE 12 - HOLDING FRAMES FOR HEPA FILTERS (BUILT-UP BANKS)

- A. General: Holding frames shall be similar and approved equal to Camfil-Farr Magna-Frame II, and shall consist of holding frame section, reinforcing flanges, annular based dimples and mounting holes, receptacle guides, and removable swing bolt assemblies. The design of the unit shall be such that it will accommodate all standard 24" x 24" x 12" HEPA filters.
- B. Construction: The holding frame shall be constructed of not less than 14-gauge galvanized steel and shall be of all welded construction, factory fabricated and assembled. All welds shall be ground and smoothly finished to provide a uniform sealing surface.
- C. Reinforcing Flanges: Reinforcing flanges shall be an integral part of the holding frame in order to preclude the possibility of deflection of the sealing flange.
- D. Annular Based Dimples and Mounting Holes: Annular based dimples and mounting holes shall be an integral part of the holding frame to provide ease of installation and mounting, and to preclude the possibility of mounting bolt interference.
- E. Receptacle Guides: Four receptacle guides shall be an integral part of the holding frame and shall be mounted on the two vertical sides of the frame. They shall be designed to properly align the filter when placed into the frame and shall function as the fulcrum for the swing bolt assemblies.
- F. Swing Bolt Assemblies: Four swing bolt assemblies shall be provided for each holding frame. Swing bolts shall be constructed of 5/16" zinc-electroplated steel and be provided with equi-bearing clamps and hex nuts in order to effect adequate and uniform pressure against the periphery of the HEPA filter. Hex nuts shall be capable of being torqued to 30 inch/lbs. each, providing for a 50% gasket compression. The swing bolt assembly shall be such that it provides for individual sealing of filters.

2.9 TYPE 13 - HOLDING FRAMES FOR HEPA FILTERS (LARGE BUILT-UP BANKS)

- A. General: Holding frames shall be similar and approved equal to Camfil-Farr Magna-Grid, Model 1A, factory assembled, built-up holding frame banks called modules, and shall consist of superframe members, a curb base, bracing, and removable swing bolt assemblies. The design of the unit shall be such that it will accommodate all standard 24" x 24" x 12" HEPA filters.
- B. Modules: Modules shall be constructed of not less than 11-gauge galvanized channel steel and shall be of all welded construction, factory fabricated and assembled. All welds shall be ground and smoothly finished to provide a uniform sealing surface. Modules shall be sized to eliminate field erection of individual frames.
- C. Superframe: Superframe members shall be an integral part of the Grid and shall be constructed of not less than 11-gauge galvanized channel steel. They shall be no less than 3.50" deep.
- D. Curb Base: A curb base shall be an integral part of the grid providing a minimum of 1.38" clearance between the HEPA filter and plenum floor. The plenum curb base shall

be 12" in depth and be constructed of 11-gauge galvanized steel. It shall occupy the entire width of the grid module.

- E. Bracing: Bracing of 11-gauge galvanized steel shall be an integral part of the module, adding reinforcement between the plenum curb base and each vertical superframe member.
- F. Swing Bolt Assemblies: Four swing bolt assemblies shall be provided for each filter to be held by the module. Swing bolts shall be constructed of 5/16" zinc electroplated steel and be provided with equi-bearing clamps and hex nuts in order to effect adequate and uniform pressure against the periphery of the HEPA filter. Hex nuts shall be capable of being torqued to 30 inch/lbs. each, providing for a 50% gasket compression. The swing bolt assembly shall be such that it provides for individual sealing of filters.

2.10 TYPE 14 - HOLDING FRAMES FOR CARBON FILTER (BUILT-UP BANKS)

- A. General: The holding frames shall be similar and approved equal to the RIGA-SORB 80 Retainer/Pack, one-piece, multi-stage filter and adsorber design. Each holding frame shall accommodate four adsorbers, four one-inch (1") medium efficiency particulate air filters, and one (1) medium or high efficiency air filter. Holding frames shall be factory fabricated, and shall be of all welded construction, painted with enamel and shall be equipped with all necessary fasteners and holding devices for the filters specified.

2.11 TYPE 15 - PAINT ARRESTOR MEDIA

- A. General: Air filters shall be specially designed to remove overspray from paint spray areas. Filters shall be effective on coatings such as lacquers, air dry or baked solvent base primer and enamel, acrylic or water base emulsions, epoxies, vinyl coatings, etc.
- B. Filter Media: Filter media shall be of the disposable type supplied in precut pads. Media shall consist of layers of progressive density expanded paper media followed by a layer of synthetic media or be composed of continuous filament fibers bonded together with a cured resin and shall specifically be designed for collection of coatings. Provide 2" thick media, or two layers of 1" thick media. Media shall be classified Class 2 Underwriters' Laboratories, Inc. Initial resistance at 500 fpm shall not exceed 0.20" w.g.
- C. Media Support Grid: The media support grid shall be a wire grid designed to support the media both vertically and horizontally.
- D. Enclosing Frame: The enclosing frame shall be constructed of galvanized or painted steel and shall be arranged to coordinate with the exhaust grille and ductwork arrangement shown on the drawings.

2.12 FILTER GAUGES

- A. Each individual filter on each air handling unit conditioning outside air shall be provided with a magnahelic filter pressure drop gauge to monitor the air pressure drop across the filter. Gauges shall be Dwyer Model No. 2001AF (0-1" WG range) for 15-35% filters and carbon filters, Dwyer Model NO. 2002AF (0-2" WG range) for 80-95% final filters and Dwyer Model No. 2004AF (0-4" WG range) for HEPA filters, or an approved equal.

- B. Where filters are installed in a concealed location, the magnahelic gauge shall be installed on a wall near the filter section in a surface mounted, labeled enclosure. The enclosure cover shall be hinged stainless steel with a cylinder lock. All cabinet locks shall be keyed alike. Where filters are installed outdoors, the magnahelic gauge shall be installed inside the rooftop unit control compartment. The magnahelic gauge shall be provided with adjustable signal flag to indicate the proper differential pressure for filter change-out as recommended by the filter manufacturer. Coordinate the location of the wall mounted gauge enclosure with the appropriate Owner's Representative.
- C. Provide DDC control interface for monitoring filter air pressure drop through the BCAS. See specification Section 25 09 16.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittal shall include, but not be limited to, the following:
 - 1. Cut sheets on filters and housings, clearly marked to show sizes, ratings, capacities, construction, features, accessories and other pertinent information.
 - 2. Cut sheets on filter gauges and mounting details.
 - 3. Additional information as specified in Section 20 05 03.

3.2 INSTALLATION

- A. Install filter housing, filters and filter gauges in accordance with the manufacturers written installation instructions.
- B. Install the initial set of filters after ductwork has been blown out and prior to continuous operation of the air handling unit. Install the second set of filters at the time of substantial completion and provide the third set of filters to the Owner's stock.
- C. Any additional filter sets required during the construction period shall be the responsibility of the Contractor.

END OF SECTION

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SECTION 23 65 19
COOLING TOWERS - STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. General: Furnish and install a factory assembled steel cooling tower as shown, scheduled and specified. The Contractor shall be responsible for all design and construction costs to provide for the tower purchased, including but not limited to electrical, structural, piping, etc.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Electronic Variable Speed Drives - Section 20 05 14
 - 2. Motors and Controllers - Section 20 05 13
 - 3. Noise and Vibration Isolation - Section 20 05 48
 - 4. Sequence of Operation - Section 23 09 93
 - 5. Water Treatment Systems - Section 23 25 10

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Evapco
 - 2. Marley
- B. Certified Performance: Cooling tower performance shall be certified by the Cooling Tower Institute in accordance with CTI's standard STD-201 or, lacking such certification shall be field tested by CTI in accordance with CTI Test Method ATC-105.
- C. Energy Efficiency: Unit shall meet or exceed the latest edition of energy efficiency per latest edition of ASHRAE 90.1 and IECC.

1.4 WARRANTY

- A. Manufacturer shall provide five (5) Year full Parts and Labor Warranty for entire tower, including structure, casing, basins, decking, fan(s), motor(s), and all mechanical drive components.

PART 2 - PRODUCTS

2.1 STEEL COOLING TOWER

- A. Scope: Furnish and install factory assembled induced draft, vertical discharge, packaged, crossflow or counterflow cooling tower of the size and capacity as shown and scheduled on the drawings.
- B. Structural Framework: Structural framework shall be corrosion resistant hot-dip galvanized steel designed for operating loads and a 60 psf wind pressure on any projected area. All steel used to support the tower shall be hot-dip galvanized.
- C. Casing: Casing panels shall be minimum Type 304 stainless steel, and/or Type 316 stainless steel, with lapped joints. All hardware shall be stainless steel. Fan cowl and fan screen shall be constructed of same material as fan section and casing.
- D. Louvers: Inlet louvers shall be two-pass PVC designed to keep water in the tower and shall be mounted in easily removable frames for basin maintenance access.
- E. Cold Water Basin: Cold water basin shall be constructed Type 316 stainless steel. Each tower cell shall include a depressed center section with drain and cleanout connections, Type 304, and/or Type 316 stainless steel suction strainer, overflow connection, integral anti-vortexing hood at each outlet, and CLA-VAL 124-01 series automatic float assembly with CLA-VAL X102 flow limiting assembly. Float valve shall be installed in a stilling well to prevent erratic float operation. A valved and plugged drain shall be installed for draining the sump box. All seams shall be factory welded for water-tight construction.
- F. Basin Heaters: Basin heaters shall be 480-volt, 3 phase electric heaters sized to prevent basin freezing at ambient temperature of 0°F. Heaters shall be factory installed and shall be complete with factory installed thermostats, low water cutouts, contactors, disconnect, and conduit. Heater wiring and raceway shall be by Division 26. Enclosures for these components shall be NEMA 4X.
- G. Pressurized Hot Water Distribution: Towers utilizing pressurized distribution, spray nozzles shall be precision molded ABS, large orifice nozzles utilizing fluidic technology for superior water distribution over the fill media. Nozzles shall be designed to minimize water distribution system maintenance. Spray header and branches shall be Schedule 40 Polyvinyl Chloride (PVC) for corrosion resistance with a galvanized steel connection through external casing to attach external piping. The branches and plastic spray nozzles shall be held in place by snap-in rubber grommets providing quick removal of individual nozzles or complete branches for cleaning or flushing. The header shall include provisions for measuring spray pressure externally. Cooling tower shall be

capable of turndown to 40% of design capacity for extended periods of time without dry-patches on fill or other degradation.

- H. Fill: Fill material shall be cross-fluted sheets of PVC complying with NFPA 220 bonded together for strength and durability. PVC fill shall be impervious to rot, decay, and fungus or biological attacks. Fill shall be self-extinguishing for fire resistance with a maximum flame spread rating of 5 per ASTM E84-81a. Fill material may be provided with integral drift eliminators.
- I. Drift Eliminators: Eliminators shall be constructed of inert PVC complying with NFPA 220 and assembled in easily handled sections. Eliminators may be integral with the fill material. Maximum drift rate shall be 0.001% or less of the circulating water rate.
- J. Fans:
 - 1. Fans shall be minimum 5 blade heavy duty axial propeller type with cast aluminum alloy blades. Each blade shall be adjustable and individually attached to the hub. All rotating elements of the fan drive assembly shall be dynamically balanced with critical speed at least 115% of running speed. Fan cowl and fan screen shall be constructed of same material as fan section and casing.
 - 2. Fans shall be gear driven fan drive designed for not less than 150% of motor nameplate power rating. Drive and all moving parts shall be protected by removable stainless steel screens and panels. Fan shaft bearings shall be rated for an L-10 life of 75,000 to 135,000 hours. Fan and motor sheaves shall be non-corrosive aluminum alloy. Extend all lubrication lines to easily accessible locations at the casing side for maintenance. Lubrication system for gear drive units shall be compatible with low speed operation from variable fan speed controls.
- K. Fan Motor: Fan motor shall be TEFC. Motors shall be high efficiency ball bearing type fan motor(s) suitable for outdoor service and operation on 460-volt, 60 Hertz, 3 phase electrical service. Each motor shall be mounted on an easily adjusted heavy-duty motor base located outside the airstream. The motor shall be sized as required for the individual fan brake horsepower with normal torque but not less than the size scheduled on the Drawings. Motors shall be 3 phase, 60 hertz, 460-volt continuous duty high efficiency type. Motors and drives shall be specifically selected and coordinated for use with electronic variable speed controllers. VFD's shall provide an anti-condensation protection mode for the motor while the motor is not in use. Refer to Section 20 05 14 for Variable Speed Drives and Section 20 05 13 for additional motor requirements.
- L. Electrical Wiring: Only the fan drive motors and vibration switches shall be supplied and installed by the cooling tower manufacturer. Complete electrical service for motors, and tower instrumentation, including hook-up, appurtenances and accessories as shown on drawings and specified elsewhere is to be furnished and installed under Division 16.
- M. Sound: Unit Sound Performance ratings shall be tested according to CTI ATC-128 standard. Sound ratings shall not exceed specified dB or dB(A) ratings

OCTAVE BAND	dB (A)
1	74
2	73
3	73
4	72
5	66
6	63
7	58
8	56

2.2 ACCESSORIES

- A. Access Doors: Access doors shall be provided on one side of each cell for access to the drive, eliminators, and spray system.
- B. Basin Equalization: Basins shall be connected between cells for water equalization. Connections shall include equalization trough with equalizer piping with isolation valves from the basin on both ends for basin isolation purposes and to expedite the future removal/replacement of cells without having to shut down the remaining cell(s).
- C. OSHA Requirements: A fan guard shall be provided for each fan cylinder. Fan guard shall be constructed of the same material as the cooling tower casing. Where required for routine maintenance purposes, the towers shall be provided with an OSHA approved perimeter hand rail, safety cage, and ladder extending to the surrounding roof, grade, or floor surface.
- D. Vibration Cut Out Switch: Provide switch to de-energize fan motors if excessive vibration occurs due to fan imbalance.
- E. Piping Connections: All piping connections shall be from the bottom of the tower. Manufacturer shall provide and route PVC piping through the cooling tower as required.
- F. Basin Sweeper: Provide with basin sweeper piping and high flow educator nozzles to facilitate the removal of particles in the basin.
- G. Single Hot-water Inlet Connection: Each cell of the tower shall include a single hot-water inlet connection located as shown on the plans. An internal system of factory-installed PVC piping shall deliver water equally to the distribution basins without the need for balancing valves. This internal piping system shall require no scheduled maintenance and shall be located such that it does not interfere with normal maintenance access. The internal piping must extend to the tower exterior surface of the tower.
- H. Mounting Access: A portable davit crane shall be mounted on the fan deck of the tower and shall be capable of lifting, extending, and lowering the heaviest mechanical component up to 1000 lb over the fan deck and down the air inlet face of the tower. The davit crane system shall include a motorized winch, cable, and load hook. Coordinate electrical power needs with electrical contractor.

PART 3 - EXECUTION

3.1 SUBMITTAL

- A. Shop drawing submittal shall include, but not be limited to, the following:
1. Material product data.
 2. Cut sheets marked clearly indicate all piping system materials to be used.
 3. Cut sheets showing tower physical dimensions, weights, etc.
 4. Cut sheets clearly marked to show all valves, accessories, and other materials to be used.
 5. Operating weights and suggested methods for supporting tower.
 6. Motor data as required in Section 20 05 13.
 7. Provide manufacturer's certified performance data.
 8. Electrical Characteristics including: voltage, wires, and full load amps for each required electrical circuit.
 9. Additional information as required in Section 20 05 03.

3.2 INSTALLATION

- A. Comply with cooling tower manufacturer's instructions for installation.
- B. Each cooling tower shall be bolted directly to a structural galvanized steel base which is mounted on vibration isolation furnished under the Section entitled "Vibration Isolation". The cooling tower manufacturer shall furnish maximum dry and wet operating weights and tower live loads for proper selection of the vibration isolation.
- C. The cooling towers shall be erected on a steel framework. Contractor to salvage and utilize existing structural steel wherever possible. Contractor is responsible to upgrade the cooling tower structure as needed to install the new cooling tower. If another manufacturer is furnished, the Architect shall be notified immediately of any modifications, additions, etc. The framework shall be constructed under another Division, but this Division shall install the necessary bolts for use in properly mounting the cooling tower in accordance with the cooling tower manufacturer's detailed requirements.
- D. All PVC internal and external piping shall be wrapped in the field with an aluminum sheathing to prevent UV degradation and other forms of damage.

END OF SECTION

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SECTION 23 73 00

AIR HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 23 05 01
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. General: Furnish and install factory-built air handling units as specified, scheduled, and shown on the Drawings.
- B. Types: Air handling units shall be of the following basic types and are scheduled on the Drawings with these abbreviated designations:
 - 1. "SZBT" - represents a single zone blow-through unit.
 - 2. "BTMZ" - represents a multizone blow-through unit.
 - 3. "HDT or VDT" - represents horizontal or vertical draw-through units.
 - 4. "HVU" - represents a heating and ventilating unit.
 - 5. "RTU" - represents a roof mounted externally protected air handling unit.
 - 6. "FCU" - represents fan and coil units. All fan and coil units are horizontal type unless they appear in the schedule as "VFCU", in which case a vertical unit is required.
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Electronic Variable Speed Drives - Section 20 05 14
 - 2. Motors and Controllers - Section 20 05 13
 - 3. Noise and Vibration Isolation - Section 20 05 48
 - 4. Air Filtering - Section 23 41 10
 - 5. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93
 - 6. Fans - Section 23 34 10

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

1. Air Handling Units, Heating and Ventilating Units:

- a. Carrier
- b. Temtrol (Basis of Design)
- c. Daikin

2. Fan Coil Units:

- a. Carrier
- b. Temtrol
- c. Daikin

PART 2 - PRODUCTS

2.1 EQUIPMENT FEATURES

- A. General: Each unit shall be equipped complete with casing, centrifugal fans, coils, fan motors and drives, insulation, drain pans, filters and shall comply with the minimum requirements indicated herein.
- B. Motors and Fans: All motors and fans shall be directive drive. Belts shall not be allowed. Contractor is responsible to ensure that all units are have direct drive or ECM fans.
- C. Units Equipped with UVC Emitters: In units equipped with UVC Emitters, all surfaces that are or may potentially be exposed to UV radiation shall be constructed of UV resistant material. This includes component housings, seals & gaskets, insulation, wiring, belts, unit casing and any other components. Materials which are not resistant to UV shall be completely shielded from such radiation by materials that are unaffected by UVC radiation.
- D. Unit Casings:
- 1. General: Unit casing shall be double-wall with solid metal liner. Casing shall be fabricated of 16 gauge exterior and 20-gauge interior, heavy-gauge steel reinforced and braced with steel angles. Sectionalized casing shall consist of separate fan and coil sections. Metal parts of casing and all accessories, with exception of coil, shall be chemically cleaned, phosphatized, and given protective enamel finish or shall be constructed of mill galvanized steel. All joints between casing sections shall be gasketed effectively to create an airtight construction. Provide unit with minimum 6" base rails continuous through unit perimeter with structural cross supports at a minimum of 36" o.c. throughout the length of the air handling unit. Base rails to be at minimum 12 gauge galvanized steel.
 - 2. Coil Sections: Coil sections shall completely enclose all return bends, coil headers, and coil connections. Units with multiple coils shall have a minimum of 12" between coil faces for coils up to 48" wide, and minimum 24" between coil faces for coils over 48" wide for access, inspection, and cleaning.

3. Drain Pans: The drain pan shall be 18-gauge 304 stainless steel, shall fully extend under the coil section to at least 12" beyond the coil, and shall be of double wall construction with 5/8" foam insulation and a vapor barrier between the pans. Inner pan shall have a factory applied corrosion resistant anti-microbial coating. Drain pan shall be sloped in all planes to the drain connection to prevent accumulation of standing water.
4. Access Doors: Access doors shall be provided such that each fan and each side of each coil are accessible for inspection and cleaning. Units with ducted return air require access doors to the upstream side of the inlet coil for draw through units and inlet fan for blow through units. Doors shall be insulated to the same specifications as the unit casing. The smallest dimension allowable on any door shall be 18" clear opening, and each door shall be at least 3/4 square foot in area. Refer to the Drawings for additional access door requirements. Access doors shall be 304 stainless steel hinged and provided with Ventlok Style 100 (smallest dimension 18" or less) or Style 140, full perimeter gaskets and steel door jams. Provide quarter turn cam lock latches. Provide unit with access on both sides of the unit at the upstream side of the coils, filters and motor/fan assembly.
5. Insulation: Plenum, fan, and coil sections shall have minimum R-13 foam insulation.
6. Plenum Sections: Provide inlet and discharge plenum sections where shown. Plenum sections shall be insulated and constructed as for other sections.
7. Internal Isolation: Units shall be provided with internal spring isolators. Isolator minimum deflection shall be 2.0" for motors up to 15 HP, and 3.0" for motors 20 HP and larger.
8. Air handling unit shall be tested and documented to leak no more than 1%-unit design flow at 8" positive and 10" negative pressures. Engineer shall select one (1) unit at their discretion, to test in the field.
9. Provide all access sections and fan sections with a 0.25" diamond checker plate non-skid aluminum floor.

E. Fans:

1. Centrifugal fans shall be double width, double inlet, multi-blade type with either forward-curved, airfoil or backward incline blades. All fan blades shall be of aluminum construction.
2. Bearings shall be grease lubricated ball bearings selected for an average life of 200,000 hours operating at design conditions. Internally-mounted ball bearings shall be furnished with extended grease lines terminated with Zerk fitting. Permanently lubricated bearings are not acceptable.
3. Fan shafts shall be of one-piece design either solid or hollow tube with swedge solid ends. Two-piece shafts will not be acceptable. Fans shall not be cantilevered. Fans shafts shall not pass through their first critical speed as fan comes up to rated rpm.

F. Fan Array:

1. Description: Direct-driven, plenum fan units, configured for horizontal flow of relatively clean air for Heating, Ventilating, and Air-Conditioning (HVAC) applications.

- a. The multiple fan array systems shall include multiple, direct driven, arrangement 4 plenum fans constructed per AMCA requirements for the duty specified class III as required. Class I fans are not acceptable. Fans shall be rated in accordance with and certified by AMCA for performance. All fans shall be selected to deliver the specified airflow quantity at the specified operating Total Static Pressure and specified fan/motor speed. The fan array shall be selected to operate at a system Total Static Pressure that does not exceed 90% of the specified fan's peak static pressure producing capability at the specified fan/motor speed. Each fan/motor cube or cell shall include a minimum 10-gauge, G 90 Galvanized steel intake wall, .100 aluminum spun fan inlet funnel, and a 10-gauge G90 Galvanized steel motor support plate rail and structure. All motors shall be standard foot mounted type TEFC selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. Motors shall meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be as manufactured by Baldor, Siemens, or Toshiba for use in multiple fan arrays that operate at varying synchronous speeds as driven by an approved VFD. Motor HP shall not exceed the scheduled HP as indicated in the AHU equipment schedule(s). Steel cased motors and/or ODP motors are not acceptable. All motors shall include permanently sealed (L10-500,000 hr) bearings and shaft grounding to protect the motor bearings from electrical discharge machining due to stray shaft currents. Each fan/motor assembly shall be dynamically balanced to meet AMCA standard 204-96, exceeding category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of 0.022" per second peak, filter in (.55mm per second peak, filter in). Fan and motor assemblies submitted for approval incorporating larger than 22" wheel size and 215 T frames size motors shall be balanced in three orthogonal planes to demonstrate compliance with the G.55 requirement with a maximum rotational imbalance of .022" per second peak filter in (0.55 mm per second peak, filter in). Copies of the certified balancing reports shall be provided with the unit O&M manuals at the time of shipment. Submittals that do not include a statement of compliance with this requirement will be returned to the contractor without review.
- b. The fan array shall consist of multiple fan and motor "cubes" or "cells", spaced in the air way tunnel cross section to provide a uniform air flow and velocity profile across the entire air way tunnel cross section and components contained therein. In order to assure uniform velocity profile in the AHU cross section, the fan cube dimensions must be variable, such that each fan rests in an identically sized cube or cell, and in a spacing that must be such that the submitted array dimensions fill a minimum of 90% of the cross-sectional area of the AHU air way tunnel. There shall be no blank off plates or "spacers" between adjacent fan columns or rows to position the fans across the air way tunnel. The array shall produce a uniform air flow profile and velocity profile within the airway tunnel of the air handling unit to equal the specified cooling coil and/or filter bank face velocity by +/- 10% when measured at a point 36" from the intake side of the fan array intake plenum wall, and at a distance of 72" from the discharge side of the fan array intake plenum wall. Submittals for units providing less than the scheduled quantity of fans and/or spacing of the

fans for multiple fan arrays shall submit CFD modeling of the air flow profile for pre-bid approval that indicates uniform velocity and flow across all internal components without increasing the length of the AHU unit or changing the aspect ratio of the unit casing as designed.

- c. Each individual cube or cell in the multiple fan arrays shall be provided with an integral and automatic back flow prevention device that prohibits recirculation of air in the event a fan or multiple fans become disabled. The system effects for the backflow prevention device(s) shall be included in the criteria for TSP determination for fan selection purposes and shall be indicated as a separate line item SP loss in the submittals.
 - d. Each fan motor shall be individually wired (including ground conductors) to a control panel containing a single VFD with bypass. The VFD shall be sized for the total connected HP for all fan motors contained in the fan array. Wire sizing shall be determined, and installed, in accordance with applicable NEC standards and local code requirements. The AHU manufacturer shall provide overload protection and disconnecting mean with individual motors.
 - e. Each fan & motor assembly shall be removable through a 24" wide, free area, access door located on the discharge side of the fan wall array without removing the fan wheel from the motor. All fan/motor access doors shall open against pressure.
 - f. Provide spare fan/motor assembly for each unique size on the project.
 - g. Provide airflow monitoring at each fan inlet.
- G. Motors: Fan Motors shall be open dripproof, 3-phase, 1750 rpm type. Refer to Section 20 05 13 for additional motor requirements.
- H. Variable Frequency Drives: Variable frequency drives shall comply with the requirements of Section 20 05 14.
- I. Filters:
- 1. Provisions for installing unit-mounted 2" pleated filters shall be furnished by the air handling unit manufacturer. Access to filters shall be provided at each end of the filter section to allow for ducted return air applications. Filter access doors shall be hinged with latches as described herein for "access doors".
 - 2. Refer to the filter schedule on the Drawings for the type of filters required and to Section 23 41 10 for actual filter media specifications. Refer to AHU schedule for location of filters.
 - 3. Contractor to provide and install a clean set of filters when requested by Test and Balance and prior to building turnover.
- J. Noise: Units shall be quiet in operation and, in combination with construction shown on the architectural drawings, shall not cause noise levels in the space greater than those shown in Section 23 05 02, Design Criteria.
- K. Water Coils:
- 1. Coils shall be AHRI certified with aluminum plate or spiral fins having a maximum of 11 fins per inch bonded to the copper tubes by means of mechanical expansion. No soldering or tinning shall be used in the bonding process. Coil

tubing shall be minimum 1/2" diameter, 0.020" wall copper tube with minimum 0.010" aluminum fins. Coils shall be provided with manual air vents and drain valves. Chilled water coils shall be minimum 6 rows, and hot water coils shall be minimum 2 rows. Casings shall be 304 stainless steel with stainless steel fasteners.

2. Coils shall be factory pressure tested under water at 225 psig with air.
3. Coil face velocities shall not exceed 500 fpm unless otherwise noted on the Drawings. Refer to the schedule on the Drawings for maximum air and water pressure drops for each coil. Maximum water pressure drop through coils shall not exceed 15 feet.
4. Steam Coils: Steam coils shall have double tube construction with inner steam distributing tubes of not less than 3/8" in diameter. Provide directional kinetic orifices suitably spaced to aid condensate removal and uniform steam distribution. Steam coils shall have vertical tubes for freeze protection.

L. Refrigerant Coils:

1. DX cooling coils shall have copper tubes with aluminum fins, mechanically bonded to the tubes. Coils for use with dual condensing units shall have two full face refrigerant circuits. A factory installed thermal expansion valve shall be provided for each circuit.
2. Coils shall be factory pressure tested under water at 225 psig with air.
3. Coil face velocities shall not exceed 500 fpm unless otherwise noted on the Drawings.

M. Electric Heating Coils:

1. Heating Elements: Heating elements shall be finned tubular open-wire type, high grade 80/20 nickel chromium with ceramic insulators and supported in a galvanized steel frame. Element wires shall not glow when operating at rated capacity. Heaters over 47 inches in any dimension shall have protective screens on the inlet side. All stages of all heater coils shall extend across the entire unit cross section regardless of the number of separate coils in the cross-section.
2. Protection: Heaters shall have disc type automatic reset thermal cut-outs for primary protection and fusible links for secondary protection as required to meet UL and NEC requirements. Both devices shall be serviceable through terminal box without removing heating element from the unit.
3. Control Panel: Provide an integral control panel with flush mounted access door on the unit side. All unit controls and electrical connections shall be installed in an internally insulated factory wired control panel with a hinged and gasketed U.L. listed, dust tight cover. Controls shall include, but not be limited to, fusing for all stages, mercury step control contactors, primary and secondary fused control power transformer, and differential air pressure switch. All components shall be factory wired such that only field connections for electrical power and external electrical controls will be required. An accurate wiring diagram shall be permanently attached to the inside of the Control Panel Door.
4. Disconnect Switches: Disconnect switches shall be furnished and installed under Division 26.
5. Codes and Standards: Heaters shall be UL listed and labeled for zero clearance installation and shall meet all applicable NEC requirements. Heater coils to be given 2000-volt dielectric test.

N. Steam humidifiers:

1. Furnish and install steam humidifiers as indicated on the Drawings. The steam humidifiers shall be of the steam separator type with an internal drying chamber and a steam jacketed distributor. The capacities shall be as shown on the Drawings for the indicated steam pressure. An inverted bucket steam trap shall be supplied on the drain connection. Furnish a pneumatic control valve and any other throttling valves required to modulate the capacity from the humidistat located in the space. The humidifier distribution tube shall be fabricated of stainless steel. The unit size and length shall be selected for the scheduled load and the duct size in which it is to be installed. Distribution shall be uniform over the entire length of the distributing tube. Furnish a temperature switch to prevent operation until the humidifier is at operating temperature. Furnish a pressure gauge with shut-off for a range of pressures 0 to 50 psig.
2. If it complies with these specifications, one of the following manufacturers will be acceptable: Armstrong Machine Works, Pure Steam or Dryomatic.

O. Ultraviolet Light System UVC Emitters:

1. General: Provide UVC Emitter and fixtures of the very high output, HVAC type. The emitter shall be hot cathode, T5 (15mm) diameter, and medium pin type. They shall produce 95% of their energy at 254 nm and be capable of producing the specified out put at airflow velocities to 1000 fpm at temperatures of 35 - 170°F. UVC emitters shall produce no ozone or other secondary contamination. The UVC fixture shall have a highly efficient electronic power source of 120 V, single phase, 60HZ. They shall be UL listed to comply with UL Standard 1995.
2. Output Verification: When tested in accordance with the general provisions of IES Lighting handbook, 1981 Applications Volume, total output per 1-inch arc length shall not be less than 10 $\mu\text{W}/\text{cm}^2$, at 1 meter, in a 400-fpm airstream of 45°F.
3. Energy Efficiency: Power supplies shall be of the high efficiency electronic type, matched to the Emitter, and capable of producing the specified intensity at no more than 80 watts of power consumption per 4 square feet of coil surface area.
4. Irradiation: Emitter and fixtures are to be installed in sufficient quantity and in such an arrangement so as to provide and equal distribution of UVC energy on the coil and in the drain pan. To maintain energy efficiency, the UVC energy produced shall be of the lowest possible reflected and shadowed losses.
5. Intensity: The minimal UVC energy striking the leading edge of all the coil fins shall not be less than 2500 $\mu\text{W}/\text{cm}^2$. This sets the minimum quantity of fixtures to be installed and their placement. Additionally, equal amounts are to strike the drain pan, either directly or indirectly.
6. Arrangement: Emitters and fixtures shall be installed on the downstream side of the cooling coil at right angles to the conforming lines of the coil fins, such that UVC energy bathes all the surfaces of the coil and drain pan as well as all of the line sight airstreams.
7. Manufacturer: If it complies with these specifications, one of the following manufacturers will be acceptable: Provide UVDI ALTRU-V, Steril-Aire, Inc., or pre-approved equal.

2.2 DRAW-THROUGH UNITS

- A. Air handling units of the draw-through type shall have the arrangements shown on the Drawings with motors installed and coils piped on the most accessible side.

2.3 FAN AND COIL UNITS

- A. Furnish and install fan coil units of the size and capacity scheduled on the Drawings. All units shall be UL approved and rated in accordance with AHRI Industry Standard 441.
- B. Unit casing shall be fabricated of 18-gauge galvanized steel. The fan and motor assembly shall be easily removable for service. Units shall have 1" supply and return duct collars.
- C. Cabinet shall be horizontal enclosed type and shall have 18-gauge steel panels acoustically and thermally insulated with 1/2" faced glass fiber insulation meeting NFPA-90A and Hospital Code requirements. Exposed panels shall be bonderized and finished with a baked primer and a finish coat of enamel.
- D. Coils shall comply with the requirements for air handling units' coils.
- E. Electrical Connections: Provide fan coil units designed for single electrical power feed and complying with all applicable NEC and UL requirements and all other applicable Codes and Standards. Units shall have a factory installed junction box with the fan motor disconnect and electric heating coil disconnect wired to the junction box. Provide unit-mounted fused disconnect switches with factory wiring from the load side of the disconnect switch to the fan motor and electric heating coil. The only field wiring shall be to the line side of the junction box. Refer to Division 26 for fuse and disconnect specifications. Fuses shall be sized for a nominal 125% of full load amperes of the load served.
- F. Fans shall be of the centrifugal, forward-curved, direct-drive type. Fan wheels shall be statically and dynamically balanced. Fan wheels and housings shall be galvanized steel.
- G. Unit shall be furnished with a drain pan fabricated of 18-gauge galvanized steel insulated with 1/2" fire retardant closed cell foam. A 7/8" OD sweat fitting shall be provided for primary drain connection. A 1/2" OD overflow secondary drain connection shall be provided. Pans shall extend under all wet areas including coils and valves. Refer to Section 23 05 10 for auxiliary drain pan construction specifications.
- H. Filters for all units shall be 1" throw-away glass fiber cartridge type.

2.4 HEATING AND VENTILATING UNITS

- A. Furnish and install heating and ventilating units of the size and capacity scheduled on the Drawings.
- B. Each unit shall be complete with casing, heating coil, filters, motor and drives, etc. and shall conform with the construction specifications for Air Handling Units except that insulation and drain pans are not required.

- C. Motors shall comply with the requirements of Section 20 05 13.
- D. Filters shall be the same as specified for air handling units.

2.5 ROOF MOUNTED AIR HANDLING UNITS

- A. General: In addition to the Equipment Features herein. Roof mounted air handling units shall also comply with requirements of this subsection. The roof mounted air handling unit shall be equipped complete with weatherproof casing, centrifugal fan, coils, fan motor and drives, insulation, drain pans, filters and shall comply with the following minimum requirements.
- B. Roof Curb: Air handling unit manufacturer shall provide a prefabricated, insulated roof curb for all roof mounted air handling units. Curb shall be of welded construction and roof-over-flashing type with built-in cant and overall height of 12" above roof surface, unless otherwise noted. Extended base curbs shall be provided to ensure intake of units are 36" minimum above the roof.
- C. Unit Base: The base shall be constructed of a heavy-duty steel which shall support all major components. The base shall consist of electrically welded structural members. Internal members shall be properly sized to allow rigging and handling of the unit. After construction, the base shall be cleaned, primed with a rust inhibiting primer, and finished with a rust inhibiting exterior enamel. Construction shall be suitable to withstand rigors of shipping and rigging. Each base shall include properly located lifting lugs.
- D. Housing: The casing shall be designed for outdoor installation and shall be leak tight against 4-inch negative static pressure. The unit housing shall be constructed of heavy gauge exterior panels supported by galvanized steel internal channels properly spaced to limit panel deflections to 1/200 the of span at design working pressures. All galvanized components shall be hot dipped conforming to ASTM A525 and shall provide a minimum of .90oz. of zinc per square foot. Exterior panels shall be secured to support channel and with screws installed around the panel perimeter. Screw spacing shall not be greater than nine (9) inches. External housing shall be 16 gauge phosphatized galvanized finish.
- E. Roof: A galvanized steel roof shall be provided and shall be flanged on all four edges, pitched for drainage which overlaps all four sides of unit. Roof shall be gasketed and secured to side panel flanges with self-tapping zinc coated screws.
- F. Floor: The unit floor shall be constructed as described for housing hereinabove, except that the floor shall be minimum 12-gauge phosphatized galvanized steel finish and 1-1/2" thick with 3/4" PCF insulation - one side having heavy kraft paper with nylon reinforcing thread and 26-gauge galvanized steel facing (to exterior) shall be installed under the floor. Insulation on top of floor is unacceptable.
- G. Drain Pan: A drain pan shall be provided beneath fan and coil section. The drain connection shall be accessible through bottom of the piping enclosure, within the roof curb dimensions. A condensate "P" trap shall be provided with the unit.
- H. Exterior Finish: The finish shall be phosphatized galvanized for factory painting. The unit panel assembly shall be painted with a two-part polyamide epoxy paint on the

exterior surfaces. Before painting, surfaces shall be cleaned, and galvanized surfaces shall be treated with a phosphate rinse to assure paint adhesion. Paint color shall be selected by the Owner or Engineer.

- I. Access Doors: Hinged access doors shall be provided into sections requiring regular inspection or maintenance. Removable hatches or panels without hinges are not acceptable for those areas. Doors shall be constructed and insulated as described for the housing and shall include a 24 gauge galvanized steel inner liner. All doors shall be on right or left side as required for service access areas as shown on the drawings. Each door shall be hinged with a minimum of two (2) 9" stainless steel piano hinges in a heavy-duty extruded aluminum frame and shall seal against a specially formed closed cell foam gasket. The gasket shall seal the door against the frame. Latching system shall include an inside handle. Door minimum actual width shall be 24" for areas requiring entrance by maintenance personnel.
- J. Insulation: The walls and roof of the unit shall be insulated with adhesive fastened insulation. Insulation shall be 2", 3 PCF fiberglass with neoprene coating (U factor = 0.10). Insulation shall meet NFPA-90A smoke and flame spread requirements and shall be marked to show compliance.
- K. Fans: Fans shall be internally isolated by steel springs with minimum 2" deflection.
- L. Motors: Motors shall comply with the requirements of Section 20 05 13.
- M. Variable Frequency Drives: Variable frequency drives shall comply with the requirements of Section 20 05 14.
- N. Dampers: An electrically operated two-position opposed blade outside air damper shall be provided. With the damper in the open position, the unit shall supply the scheduled full outside air cfm. Balancing shall be provided for return and outside air for the unit as shown on the drawings. Dampers are to be used for mixing and shall be arranged to provide convergent airflow to minimize stratification. Dampers shall have opposed blade operation. Damper blades and frame shall be minimum 16-gauge galvanized steel. Blades shall be maximum 6" wide, 48" long, and shall be formed to the interlocking and provide a full-length blade stop. Each blade shall be supported by plated steel axles mounted in molded synthetic bearings. Damper frames and blades shall have vinyl edges and aluminum jamb seals to minimize leakage. Dampers shall close when the unit is off.
- O. Piping Connections: Coil piping and condensate drain piping shall enter/exit from the unit through the roof curb and shall be piped, including field installed control valves completely inside the unit.
- P. Outside Air Hood: An outside air inlet hood with moisture eliminators shall be provided and the outside air intake shall be configured such that the bottom of the outside air intake is a minimum of 3 feet above the roof.

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Submittals shall include, but not be limited to, the following information:

1. Catalog cut sheets for all air handling units, fan and coil units and condensing units, clearly marked to show unit size, capacity, coil connections, motor location, construction, and insulation.
2. Data and catalog cut sheets for insulation, adhesives, anti-microbial mastic, etc.
3. Fan curves with selection point clearly marked.
4. Specific sound power levels radiated and radiated sound power levels at design operating conditions for each unit. Plot these on an NC criteria curve. Unit discharge noise levels at design operating condition.
5. Minimum Circuit Ampacity (MCA) for each circuit.
6. Maximum Overcurrent Protection (MOCP) for each circuit.
7. Control panel Interrupting rating (AIC)
8. Motor data required in Section 20 05 13.
9. Additional information as required by Section 20 05 03, Basic Division 20-28 Requirements.

3.2 INSTALLATION

- A. Air handling units shall be installed where shown on the Drawings.
- B. Refer to Section 20 05 05 for equipment pad requirements and to Section 20 05 48 for vibration isolation.
- C. Elevate units sufficiently to allow proper installation of the condensate drain P-trap detail shown on the Drawings.

3.3 INSTALLATION OF UVC EMITTERS

- A. Coordinate the installation per the instructions of the UVC light manufacturer and install UVC lights as indicated after the air handling units are installed and ready for start-up.
- B. When double ended UVC lights are wired end to end inside an air handling unit the lights shall be mounted on a non-corrosive aluminum structural light rail and have no-exposed screws tips. The location and spacing of the lights shall be in accordance with the UVC light manufacturer's recommendations.
- C. Provide a light switch on the outside casing of the unit near the access door of the air handling unit to the UVC lights to turn the lights off before the access door is opened.
- D. Install the manufacturers "Caution" labels on all access doors to the UVC lights.

END OF SECTION

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SECTION 23 81 14

ROOF MOUNTED AIR CONDITIONING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Design Criteria - Section 20 05 02
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods - Section 20 05 05
 - 5. Scope of Work - Section 23 05 01
 - 6. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93

1.2 SCOPE

- A. Furnish and install DX rooftop air conditioning units as shown, scheduled, and specified. Provide three sets of filters for each unit.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Motors and Controllers - Section 20 05 13
 - 2. Noise and Vibration Isolation - Section 20 05 48
 - 3. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93
 - 4. Ductwork and Sheet Metal - Section 23 31 13

1.3 QUALITY ASSURANCE

- A. Manufacturers: The basis of design unit equal to existing equipment serving Phase I building. Subject to compliance with requirements, manufacturers offering rooftop units which may be incorporated in the work include, but are not limited to, the following:
 - 1. AAON
 - 2. Daikin
 - 3. JCI
 - 4. Carrier
- B. CODES AND STANDARDS
 - 1. Testing and rating of rooftop units under 135,000 btu/hr. capacity shall be in accordance with AHRI 210/240 "Standard for Unitary Air-Conditioning Equipment" and provide Certified Rating Seal. Sound testing and rating of units shall be in accordance with AHRI 270 "Standards for Sound Rating of Outdoor Unitary Equipment". Units shall bear Certified Rating Seal.
 - 2. Refrigerating system construction of roof units shall be in accordance with ASHRAE 15 "Safety Code" for Mechanical Refrigeration.
 - 3. Energy Efficiency Ratio (EER) of rooftop units shall be equal to or greater than that specified in the current applicable version of the International Energy Conservation Code (IECC) and all applicable amendments.
 - 4. Rooftop units shall be designed, manufactured, and tested in accordance with UL Standards 465.

- C. Warranty: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, compressors and heat exchangers having inadequate and defective material and workmanship, including leakage, breakage, improper assembly, or failure to perform as required. Provide manufacturer's written instructions for handling, installing, protecting, and maintaining units during warranty period. Replacement is limited to component replacement only and does not include labor for removal and reinstallation. Provide full five (5) year all parts, labor and refrigerant warranty.
- D. Extra Materials: Furnish to Owner, with receipt, the following spare parts for each rooftop heating and cooling unit:
1. One (1) set of matched fan belts for each belt-driven fan.
 2. Three (3) set filters for each unit.

PART 2 - PRODUCTS

2.1 ROOFTOP UNITS

- A. General: Units shall be factory-assembled and tested, designed for roof or slab installation, and consist of compressors, condensers, evaporator coils, condenser and high static pressure evaporator fans, gas heating section, hot-gas reheat, refrigeration and temperature control, powered exhaust, economizer, filters, and dampers. Capacities and electrical characteristics are scheduled on the Drawings.
- B. Casing:
1. Manufacturer's exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
 2. Casing shall have hinged access doors for inspection and access to internal parts and filters 2" thick.
 3. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D-1929 for a minimum flash ignition temperature of 610°F.
 4. Exterior condensate drain connection and lifting lugs.
 5. Unit shall include 1 inch aluminum mesh pre filters upstream of the outside air opening.
- C. Roof Curb: Shall be constructed of galvanized steel with a wood nailer strip. Provide custom fabricated curbs for sloped roofs such that installed unit is level. Coordinate curbs with roof design shown on the Architectural and Structural Drawings. Curbs are to be fully gasketed between curb top and unit bottom. Unit shall be mounted on a factory furnished solid bottom acoustical style roof curb fully lined with 1" of Neoprene coated fiberglass insulation. Height of curb shall be as shown on the drawings. In the event of replacement on existing roof curb, provide roof curb adapter to ensure new unit installs on existing roof curb.
- D. Evaporator Fans: Unit shall include direct drive, unhooded, backward curved, plenum supply fan. Blower and motor shall be dynamically balanced. Motor shall be a high efficiency electrically commutated motor or provided with variable frequency drive factory wired and mounted in the unit. Fan motor shall be inverter rated efficiency.
- E. Condenser Fans: Propeller-type, direct-driven fans with permanently lubricated bearings, solid fan shafts, and totally enclosed motors.
- F. Evaporator Coils:
1. Aluminum Fin and Copper Tube Type: Fins shall have collars drawn, belled and firmly bonded to the tubes by means of mechanical expansion of the tubes. No soldering or

tinning shall be use in the bonding process. Coils shall have a galvanized steel casing. Coils shall be mounted in the coil casing with same end connections accessible for service. Coil selection shall be completely insulated.

2. Refrigerant Cooling Coils: Coil shall have an equalizing type vertical distributor to ensure each coil circuit receives the same amount of refrigerant. Coils shall be proof (450 psig) and leak (300 psig) tested with air pressure under water, then cleaned, dehydrated, and sealed with a holding charge of nitrogen. Coils shall have multiple circuits intertwined such that full coil face remains active when only one circuit is in operation.
3. Drain Pan: Drain pan shall extend downstream of coil the length of half the cooling coil height, and shall be non-corrosive, double sloped per ASHRAE 62.1-2004. Units to be provided with a high condensate level switch that shuts down the unit when a high water level is detected in the drain pan.

G. Refrigeration System:

1. Compressor(s) shall be scroll type with crankcase heater(s), internal thermal overload protection, internal spring isolators and mounted on the compressor manufacturer's recommended rubber vibration isolators.
2. Compressors shall be scroll type with thermal overload protection and carry a 5 year non-prorated warranty, from the date of original equipment shipment from the factory.
3. All units shall have a variable capacity compressor on the lea refrigeration circuit and a minimum of two steps on the lag circuit. .
4. Compressor(s) shall be mounted in an isolated compartment to permit operation of the unit without affecting condenser air flow when the compressor compartment is open.
5. Compressor(s) shall be isolated from the base pan and supply air to avoid any transmission of noise from the compressor into the building area.
6. System shall be equipped with thermostatic expansion valve refrigerant flow control.
7. System shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant controls.
8. Unit shall be equipped with Schrader type service fittings on both the high- and low-pressure sides of the system.
9. Unit shall be equipped with refrigerant liquid line filter driers.
10. Unit shall be fully factory charged with refrigerant R-454B.

H. Provide Factory Installed Terminal Block for Field Installation of Controls:

1. All end devices, controllers, and sequencing to be field installed by Building Automation System.
2. Units to be provided with motorized dampers for economizer control. Economizer to be controlled by BAS via 2-10VDC.

I. Disconnect Switches: Disconnect switches shall be factory mounted.

J. Filter Section:

1. Standard filter section shall consist of 4" thick MERV 13, as specified in Section 23 41 10.
2. Filter face velocity shall not exceed 500 FPM at nominal airflows.
3. Staggered filter installation is optional.

K. Sequence of Operation by BAS - VAV Control:

1. Unit shall utilize a variable capacity compressor system and a variable speed fan system to modulate cooling and airflow as required in meeting the space temperature needs and to save unit operating energy. Unit fan speed shall modulate based on space temperature, not supply air pressure.
2. Unit shall be controlled to meet supply air temperature. Mixing boxes and bypass ducts shall not be required for operation as a single zone VAV system.

L. Electrical Requirements: All unit power wiring shall enter unit cabinet at a single location. Include factory mounted disconnect switch, convenience outlet, and factory installed internal wiring.

M. Motors:

1. Compressor motor shall be cooled by suction gas passing through motor winding and shall have line break thermal and current overload protection.
2. Indoor blower motor shall have permanently lubricated bearings and inherent automatic reset thermal overload protection.
3. Outdoor totally enclosed motor shall have permanently lubricated bearings, and inherent automatic reset thermal overload protection.

N. Special Features:

1. Wind Design Criteria:

- a. Supports: Provide supports and miscellaneous steel members for equipment and be responsible for coordinating this Work and setting equipment in place. Roof curb and other components shall be designed to sustain the wind loading prescribed by the building code. Refer to Section 20 05 05 3.17 B for additional requirements.

2. Roof Curb:

- a. Formed 16-gauge galvanized steel with wood nailer strip and capable of supporting entire unit weight.
- b. Allow for installing and securing ductwork to curb prior to mounting unit on the curb.
- c. Custom fabricated curbs shall be provided for sloped roof as shown on the Architectural and Structural Drawings.

3. Outside Air Damper:

- a. Motor operated fully modulating damper constructed of extruded aluminum, hollow core, air foil blades with rubber edge seals and aluminum end seals. Damper blades shall have motorized actuators and designed to have no more than 4 CFM of leakage per square foot of damper area when subjected to 1" WG air pressure differential across the damper. Damper motor shall be designed to insure closing of outdoor air damper during periods of unit shut down or power failure.
- b. Outside air intake shall be a minimum of 18" above the adjacent roof surface.

4. Compressor Cycle Delay: Compressor shall be prevented from restarting for a minimum of 5 minutes after shutdown.

5. Unit Control System:

- a. Interface with BCAS for control and monitoring.

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Submittals shall include, but not be limited to, the following information:

1. Catalog cut sheets for all air handling units, fan and coil units and heating and ventilating units, clearly marked to show unit size, capacity, coil connections, motor location, construction, and insulation.
2. Fan curves with selection point clearly marked.
3. Specific sound power levels radiated and radiated sound power levels at design operating conditions for each unit. Plot these on an NC criteria curve. Unit discharge noise levels at design operating condition.
4. Motor data required in Section 20 05 13.
5. Control system data.

6. Additional information as required by Section 20 05 03, Basic Division 20-28 Requirements.

3.2 INSTALLATION

- A. General: Install rooftop units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored, and maintain manufacturer's recommended clearances. Install thermostats where indicated on the drawings or as directed by Architect/Engineer.
- B. Support: Install and secure roof curb to roof structure in accordance with National Roofing Contractor's Associated (NRCA) installation recommendations and shop drawings. Install and secure rooftop units on curbs and coordinate roof penetrations and flashing.
- C. Filters: Three sets of filters shall be supplied for each unit. One set shall be installed at initial unit start-up after ductwork has been blowout and shall be used during balancing and testing, the second set shall be installed at the time of substantial completion and the third set shall be turned over to the Owner. Any additional filter sets required during the construction period shall be the responsibility of the Contractor.
- D. Start-up: Start-up rooftop units in accordance with manufacturer's written start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning control and equipment.
- E. Instructions: Instruct Owner's personnel in operation and maintenance of rooftop units. Training shall include start-up and shut-down, servicing and preventative maintenance schedule procedures, trouble-shooting procedures and procedures for obtaining repair parts and technical assistance. Review operating and maintenance data contained in the Operating and Maintenance Manuals specified in Division 1 and Section 20 05 03.
- F. Supports: Provide supports and miscellaneous steel members for equipment and be responsible for coordinating this Work and setting equipment in place. Roof curb, unit casing and other components shall be designed to sustain the wind loading prescribed by the building code. Refer to Section 20 05 05, 3.17, B for additional requirements.

END OF SECTION

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SECTION 25 05 01

SCOPE OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Refer to Specification Section 20 05 00 for related required Codes and Standards.
- C. Refer to Specification Section 20 05 04 for related required Schedule of Submittal Data.
- D. Requirements of Division 20 apply to all Work of Divisions 20-28.

1.2 SCOPE

- A. General: Where renovation work requires addition or adjustment to the building automation system, the contractor is responsible to provide a fully integrated Building Control and Automation System (BCAS) incorporating Direct Digital Control (DDC), energy management hardware and software, equipment monitoring and control, and common Ethernet TCP/IP LAN for the additional controls items per the contract document. This Division requires the furnishing and installing of all items Specified herein, and as indicated on the Drawings, or reasonably inferred as necessary for safe and proper operation; Including every article, device or accessory (whether or not specifically called for by item) necessary to facilitate each system's functioning as indicated by the design, the equipment specified, the sequence of operation specified, and input/output tables and points list. Elements of the work include, but are not limited to, materials, labor, engineering, supervision, supplies, equipment, transportation, storage, utilities, services, programming, testing, and all required permits and licenses.
 - If necessary, the Owner will provide all communication media, connectors, repeaters, network switches, and routers necessary for the high-speed Ethernet network. An active Ethernet port will be provided adjacent to each System Controller and operator interface (PC) for connection to this high-speed Ethernet network.
- B. Drawings: Refer to the Mechanical, Electrical, and Plumbing Drawings for graphic representations, equipment schedules, and notations showing elements of building control and automation work.
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - Commissioning - Division 01 and Section 20 08 00
 - Variable Speed Drivers - Section 20 05 14
 - Water Chilling Units - Section 23 64 16

- Conductors - Section 26 05 19
- Conduit - Section 26 05 33
- Power Distribution Equipment - Section 26 27 10
- Building Security System - Division 28

D. Work included: The work includes, but is not limited to, the following systems, equipment, and services:

- Provide a complete new Building Control and Automation System. The BCAS shall be comprised of a Network Server, Network Area Controller or Controllers (NAC) within the facility. The NAC shall connect over a management level Local Area Network (LAN) using high-speed BACnet MS/TP, BACnet Zigbee, or BACnet Ethernet TCP/IP. Access to the system, either locally in the building, or remotely from a central site or sites, shall be accomplished through standard Web browsers, via the Internet and/or LAN.
- Each NAC shall communicate to field level DDC controllers provided under this section of the contract documents using BACnet MS/TP or BACnet Zigbee (802.15.4) as defined by the Zigbee Standard.
 - a. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.
 - b. Wireless equipment controllers and auxiliary control devices shall conform to:
 - 1) IEEE 802.15.4 radios to minimize risk of interference and maximize battery life, reliability, and range.
 - 2) Communication between equipment controllers shall conform to ANSI/ASHRAE Standard 135-2016 (BACnet®/ZigBee®) standard as BACnet tunneling devices to accommodate future integration.
 - 3) Operating range shall be a minimum of 200 feet (60 m); open range shall be 2,500 ft. (762 m) with less than 2% packet error rate.
 - 4) To maintain robust communication, self-healing, redundant mesh networking and two-way communications shall be used to optimize the wireless network health.
 - 5) Wireless communication shall be capable of many-to-one sensors per controller to support averaging, monitoring, and multiple zone applications.
 - 6) Space/wall sensors shall be available with batteries with a typical life of 15 or more years to minimize maintenance costs or with power harvesting capabilities to minimize the need for batteries.
 - 7) The controls wireless network shall be secured using Advanced Encryption Standard AES-128 (FIPS Pub 197) and HMAC (FIPS Pub 198). A Trust Center will create a randomly generated 128-bit network security key for each ZigBee network.
 - 8) Certifications shall include FCC CFR47 - RADIO FREQUENCY DEVICES Section 15.247 & Subpart E.
- Provide all necessary hardware shall be BACnet BTL (BACnet Testing Laboratories) with appropriate classifications:

- a. System controller shall be BTL listed BACnet Building Controller (B-BC).
 - b. Equipment Controllers shall be BTL listed BACnet Application Specific Controller (B-ASC) or BACnet Advanced Application Controller (B-AAC), as appropriate for the purpose of the controller.
- Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
 - Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
 - Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
 - Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.
 - Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.
 - Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
 - Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.
 - Provide a comprehensive operator and technician training program as described herein.
 - Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.
 - Provide computer software and hardware, operator input/output devices, control units, local area network (LAN), sensors, control devices, actuators, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories to operate mechanical systems, and to perform integration functions specified.
 - All necessary controls, wiring and installation shall be provided and installed. Provide a complete system of devices to perform the sequences and programs outlined in Sections 25 09 93 and 25 09 33 including, but not limited to:
 - a. Electric, electronic and computer control for all items shown on the Drawings, to provide the specified Sequence of controls as specified hereinafter including thermostats, sensors, relays, and motors.
 - b. Electric damper operators and control valves furnished to the appropriate trade as specified under the Work of other Sections.
 - c. Control panels as specified hereinafter and as shown on the Drawings.
 - Participate in Owner's Commissioning Plan, and support Owner's Building Commissioning Agent as necessary per Owner's Project Requirements and Divisions 1 and 20 Specifications.
 - Integrate building's water chilling units, variable frequency drives, and other pre-packaged controlled units through BACnet MS/TP or IP with full access to all attributes including control and reporting of these attributes. Coordinate with Division 23 Contractor.

- Other miscellaneous control system components as shown on the Drawings, specified herein, and/or required.

E. Work of Other Sections:

- Control valves, flow meters, air flow stations, automatic dampers, temperature sensors, flow switches, pressure switches, and other duct and piping system sensors and control devices shall be furnished under this Section for installation by the Division 23 Contractor.
- The Division 23 Contractor shall:
 - a. Install immersion wells, pressure taps and any associated shut-off cocks.
 - b. Install flow switches and water flow sensors.
 - c. Install automatic control valves.
 - d. Install level switches.
 - e. Furnish and install Venturi flanges.
 - f. Install Venturi and flow sensors.
 - g. Furnish and install automatic valve flanges, flange gaskets, increasers, reducers, nuts, and bolts as required.
 - h. Furnish and install flare nuts for unitary valves.
 - i. Furnish and install union fittings where required in unitary equipment for service of automatic valves, including necessary transitions.
 - j. Install automatic control dampers.
 - k. Provide and install necessary transitions and blank-off plates required to install automatic control dampers that are different than duct size.
 - l. Assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper motors.
 - m. Provide and install necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation and affix and seal permanently in place only after stratification problem has been eliminated.
 - n. Provide, install, and label access door or other approved means of access through ducts for service to control equipment.
 - o. Provide and install necessary duct transitions to provide velocities as recommended by airflow station manufacturers.
 - p. Install airflow measurement stations as indicated on the Drawings, specified, or required.
 - q. The chillers furnished under Division 23 shall include all factory-furnished control devices, transformers, relays and other appurtenances as required per the chiller manufacturers wiring diagram. All wiring on the chiller shall be the responsibility of the chiller manufacturer. The control interface module for each chiller shall be furnished and factory installed by the chiller manufacturer.
 - r. HVAC terminal units provided by Division 23 shall have factory mounted and wired velocity transducer, controllers and damper actuators provided by the BCAS subcontractor for installation by the terminal unit manufacturer.

- The Division 26 Contractor shall:
 - a. Provide control power source circuits to all BCAS control panels. All other BCAS control wiring and control power source circuits required but not shown on the Electrical Drawings shall be included in the work of this Section.
 - b. Fire alarm interface relays and addressable input devices shall be provided by Fire Alarm Contractor. Interface relays shall be mounted adjacent to motor starters. Control wiring to these relays from the fire alarm system shall be by Fire Alarm Contractor and wiring of HVAC control circuits shall be by this Contractor. Fire Alarm work shall be contracted under Division 26.

- F. System Capacity: The addition to the BCAS system shall have adequate front end capacity to accommodate a 30% increase in connected points, in excess of those specified, without the addition of any new hardware or software to the front end. Each stand-alone DDC Controller as defined herein shall have minimum of 20% spare points, in excess of those specified.

1.3 COORDINATION WITH OTHER TRADES

- A. The BCAS Contractor shall be responsible for coordinating the Work of this section with the Work of other sections and Divisions 20-28 and providing all materials and labor required for installation of the Building Control and Automation System, which is not specified to be provided under another Division.
- B. During the course of construction, the BCAS Contractor shall be responsible for coordinating BCAS provisions by other Divisions and shall be responsible for the proper installation of all provisions. Where provisions are not properly coordinated, it shall be the responsibility of this Division to correct the provisions at the expense of the BCAS Contractor.
- C. The BCAS Contractor shall be responsible for reviewing the Division 20-28 Drawings and Specifications to determine the BCAS provisions and interface points provided under those Divisions and coordinating the work of this Section as required to properly interface.
- D. The BCAS Subcontractor shall participate in and assist in the operation of the fire safety ventilation equipment as required during the performance testing and startup of the Division 28 Fire Detection, Alarm and Communication Systems. Refer to Division 28 Section 28 31 00 titled "Fire Alarm and Communication Systems" for additional requirements.
- E. The BCAS Contractor shall participate in the development of coordinated drawings with the Division 20-28 Subcontractors. The Division 21, 22, and 23 Subcontractors shall indicate all mechanical, plumbing and fire protection work on the drawings. The Division 26 Subcontractor shall then add the electrical and fire detection, alarm and communication system work to the drawings. The BCAS Subcontractor shall indicate the required Division 25 work on the drawings. Assist and cooperate with the other trades to ensure a complete and coordinated set of drawings has been generated.

- F. The Division 25 Contractor shall coordinate installation, testing and commissioning of Owner's Vertical Backbone Riser (OVBR) with other Trades (i.e., Security Contractor) who are reliant on functionality of OVBR to complete their work. The General Contractor shall provide schedule requirements to Division 25 Contractor.

1.4 PRE-QUALIFIED CONTRACTORS

- A. Installation by the following contractors is acceptable contingent upon compliance with all aspects of the Specifications.
- Automated Logic Corp. (Factory Branch)
 - Unify Energy Solutions

1.5 QUALITY ASSURANCE

- A. General: All of the following Quality Assurance requirements shall be met:
- All BCAS work shall be furnished and installed by the Division 25 Contractor. The work shall be performed by skilled technicians under the direction of experienced engineers, all of whom shall be properly trained and qualified for this work.
 - All materials and equipment used shall be standard catalogued components, regularly manufactured for use in HVAC control systems, and not custom designed for this project. All systems and components shall be manufacturer's latest standard design and have been thoroughly tested and proven in actual use.
 - Single source responsibility of the BCAS Contractor shall be the complete installation and proper operation of the BCAS, and shall include debugging and proper calibration of each component in the entire system.
 - The BCAS Contractor shall have an established support facility within 100 miles of the project site with factory trained technical staff, spare parts inventory, and all necessary test and diagnostic equipment. The BCAS Contractor must provide 24 hours/day, 7 days/week response in the event of a customer warranty or service call.
 - Maintenance service contract by supplier using an established program shall be available to the Owner following the warranty period.
 - The specification covers minimum requirements and is not intended to preclude provisions of equipment or methods that exceed the requirements.
 - All electronic equipment shall conform to the requirements of FCC regulation Part 15, Section 15 governing radio frequency electromagnetic interference and be so labeled.
 - Electrical work and safety requirements shall comply with NFPA 70 and all applicable local and state codes.
 - The system shall use BACnet MS/TP, as the communications protocol from node to node and from nodes to the network area controllers. System level integration shall be via BACnet MS/TP, TCP/IP over a BACnet Ethernet LAN or Modbus.
 - Control system components shall be new and in conformance with the following applicable standards for products specified:
 - a. American Society for testing materials, ASTM

- b. Institute of Electrical and Electronic Engineers, IEEE
 - c. National Electrical Manufacturers Association, NEMA
 - d. Underwriters Laboratory, UL (UL 916)
 - e. FCC Regulation, Part 15, Section 156
 - f. National Fire Protection Association, NFPA
 - g. Local building codes
 - h. BACnet Testing Lab (BTL)
- The Manufacturer of the network and unit controllers shall provide documentation supporting compliance with ISO-9001 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing). Product literature provided by the network and unit controller manufacturer shall contain the ISO-9001 Certification Mark from the applicable registrar.
- Use new products that the manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Do not use this installation as a product test site unless explicitly approved in writing by the owner or the owner's representative. Spare parts shall be available for at least five years after completion of this contract.
- Environmental Conditions of Operation:
 - a. DDC controller and I/O equipment shall be designed to operate in ambient temperatures from 32°F to 122°F and relative humidity from 10% to 95% non-condensing.
 - b. Sensors and Operating Devices: The environment that they are sensing or controlling but not less severe than for controller and I/O devices.
- Ratings: All equipment shall be rated for continuous operation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified or normally encountered at the installed location.

1.6 SUBMITTAL REQUIREMENTS

- BAS manufacturer shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software being provided for this project. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications. Five (5) copies are required. All shop drawings shall be provided to the Owner electronically as .dwg or .dxf file formats once they have been approved and as-built drawings have been completed.
- Quantities of items submitted shall be reviewed by the Engineer and Owner. Such review shall not relieve the BAS manufacturer of furnishing quantities required based upon contract documents.
- Provide the Engineer and Owner, any additional information or data which is deemed necessary to determine compliance with the specifications or which is deemed valuable in documenting and understanding the system to be installed.
- Submit the following within 90 days of contract award:
 - a. A complete bill of materials of equipment to be used indicating quantities, manufacturers and model numbers.

- b. A schedule of all control valves including the valve size, pressure drop, model number (including pattern and connections), flow, CV, body pressure rating, and location.
 - c. A schedule of all control dampers including damper size, pressure drop, manufacturer, and model number.
 - d. Provide all manufacturers' technical cut sheets for major system components. When technical cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Include:
 - 1) Building Controllers
 - 2) Custom Application Controllers
 - 3) Application Specific Controllers
 - 4) Operator Workstations
 - 5) Portable Operator Terminals
 - 6) Auxiliary Control Devices
 - e. Provide proposed Building Automation System architectural diagram depicting various controller types, workstations, device locations, addresses, and communication cable requirements.
 - f. Provide detailed termination drawings showing all required field and factory terminations, as well as terminal tie-ins to DDC controls provided by mechanical equipment manufacturers. Terminal numbers shall be clearly labeled.
 - g. Provide points list showing all system objects and the proposed English language object names.
 - h. Provide a sequence of operation for each controlled mechanical system and terminal end devices.
 - i. Provide a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet system level device (i.e. Building Controller & Operator Workstations) type. This defines the points list for proper coordination of interoperability with other building systems if applicable for this project.
 - j. Provide BacNET Certification and functional profile SNVT's for unitary-level controllers (i.e. chillers, RTU's, AHU's, Terminal VAV boxes, FCU's, UV's, etc.) for interoperability with other building systems if applicable for this project.
- Project Record Documents: Upon completion of installation, submit three (3) copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and include:
 - a. Project Record Drawings - These shall be as-built versions of the submittal shop drawings. One set of electronic media including CAD .dwg and .pdf drawing files shall be provided.
 - b. Testing and Commissioning Reports and Checklists signed off by trained factory (equipment manufacturers) and field (BAS) commissioning personnel.
 - c. Operating and Maintenance (O & M) Manuals - These shall be as-built versions of the submittal product data. In addition to the information

required for the submittals, Operating & Maintenance manual shall include:

- 1) Names, address and 24-hour/7-day per week telephone numbers of Contractor personnel managing and installing equipment, along with service personnel responsible for supporting the ongoing warranty and services of the control system.
 - 2) Procedures for operating the BAS including logging on/off, alarm management, generation of reports, trends, overrides of computer control, modification of setpoints, and other interactive system requirements.
 - 3) Description of the programming language including syntax, statement descriptions, algorithms, calculations, point database creation and modification, program creation and modification, and operator use of the editor.
 - 4) Explanation of how to design and install new points, new DDC controllers, and other BAS hardware.
 - 5) Preventative Maintenance and calibration procedures; hardware troubleshooting; and hardware repair and/or replacement procedures.
 - 6) Documentation of all software program logic created for Custom Programmable Controllers including the overall point database. Provide one set of magnetic media containing files of the software and point database.
 - 7) One set of electronic media containing files of all operator color graphic screens for the project.
 - 8) A list of recommended spare parts including pricing, manufacturer, supplier, and part numbers.
 - 9) Documentation, installation, and maintenance information for all third party hardware/software products provided including personal computers, printers, hubs, sensors, valves, etc.
 - 10) Original issue media for all software provided, including operating systems, programming language, operator workstation software, and graphics software.
 - 11) Licenses, Guarantee, and Warranty documents for all equipment and systems.
 - 12) Recommended preventive maintenance procedures for all system components including a schedule of tasks (inspection, cleaning, calibration, etc.) and task descriptions.
- Training Manuals: The BAS manufacturer shall provide a course outline and copies of training manuals at least two weeks prior to the start of any corporate training class to be attended by the Owner.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

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SECTION 25 09 01

INSTALLATION, TESTING, AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 25 05 01

1.2 SCOPE

- A. Installation requirements, testing and training specifications for the Building Control and Automation System (BCAS).

1.3 RELATED SECTIONS

- A. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Commissioning - Section 20 08 00 and Division 1
 - 2. All Division 25 Sections
 - 3. Conductors - Section 26 05 19
 - 4. Conduit - Section 26 05 33
 - 5. Lighting Control System - Section 26 09 33

1.4 QUALITY CONTROL

- A. All components shall be tested by the BCAS subcontractor to ensure compliance with the specifications before they leave the BCAS subcontractor's premises and shall be tested again on-site by the BCAS subcontractor before the commencement of acceptance testing. The BCAS subcontractor shall not ship components to the project site until they have been found to be fully compliant with the specifications and the BCAS subcontractor shall not request the commencement of acceptance testing until such time as a complete and thorough checkout of all equipment has been made by the BCAS subcontractor.
- B. Any component furnished under this contract shall be made available for inspections or tests. As deemed necessary by the Owner and/or Consultant. Use of any component by the Owner shall not imply acceptance of the system or acceptability of any

component. Availability and demonstration of the systems shall not be withheld, and the use of components shall not imply the start of the warranty period.

- C. Testing of equipment requiring starting procedures may be performed by the Contractor, where manufacturer representatives are not required.
- D. All costs associated with the required inspections, testing and commissioning shall be included in this scope of work. Additional charges will not be accepted.

PART 2 - PRODUCTS

2.1 BCAS WIRING MATERIALS

- A. In exposed areas, wiring shall be jacketed cables installed with or without conduit as specified below or single conductors installed in conduit. Control wiring shall have minimum 300-volt insulation for low voltage wiring 600 volt insulation for the line voltage wiring.
- B. Minimum requirements for control wiring shall be as follows:
 - 1. Digital Functions: Control wiring for digital functions shall be No. 18 AWG copper minimum, with 300-Volt insulation. Multi-conductor wire shall have an outer jacket of polyvinyl chloride (PVC) where installed in conduit or UL-listed plenum rated jacket where installed without conduit.
 - 2. Analog Functions: Control wiring for analog functions shall be No. 18 AWG copper minimum, with 300 volt insulation, twisted and shielded, 2-, 3-, or 4-wire to match analog function hardware. Multi-conductor wire shall have an outer jacket of PVC where installed in conduit or UL-listed plenum jacket where installed without conduit.
 - 3. Sensor Wiring: Sensor wiring shall be No. 20 AWG copper minimum, twisted and shielded, 2-, 3-, or 4-wire to match analog function hardware. Multi-conductor wire shall have an outer jacket of PVC where installed in conduit or UL-listed plenum rated jacket where installed without conduit.
 - 4. Low Energy Conductors: Class 2 low energy conductor sizes specified for digital and analog functions shall take precedence over any requirements for Class 2 low energy remote control and signal circuit conductors specified elsewhere, unless the NEC requires a larger conductor size.
 - 5. LAN Cable: All Local Area Network (LAN) network cabling shall be Cat 5 or Cat 6, 24 gauge cable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before commencing testing, verify that systems are complete and operable to the following extent:
 - 1. Equipment is operable and in a safe and normal condition. (By mechanical contractor)

2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment. (By electrical contractor)
 4. All air filters are clean and in place. If required, install temporary media in addition to final filters. (By mechanical contractor)
 5. Correct fan rotation. (By mechanical contractor)
 6. Fire, smoke, and volume dampers are in place and open. (By electrical contractor)
 7. Coil fins have been cleaned and combed. (By mechanical contractor)
 8. Access doors are closed, and duct end caps are in place. (By mechanical contractor)
 9. Air outlets are installed and connected. (By mechanical contractor)
 10. Duct system leakage is below specified level. (By mechanical contractor)
 11. Hydronic systems have been flushed, filled, and vented. (By mechanical contractor)
 12. Proper strainer baskets are clean and in place. (By mechanical contractor)
 13. Service and balance valves are open. (By mechanical contractor)
- B. Report any defects or deficiencies noted during performance of services to Architect/Engineer.
- C. Promptly report abnormal conditions in mechanical systems or conditions that prevent system balance.
- D. If, for design reasons, system cannot be properly balanced, report as soon as observed.
- E. Beginning of work means acceptance of existing conditions.
- 3.2 PREPARATION (By mechanical contractor)
- A. Provide all material, equipment, and personnel, including factory personnel where specified or required, to fully check out and start up all equipment and systems as specified in accordance with manufacturer's requirements.
- B. No water piping systems shall be "pumped" until all piping has been hydrostatically tested, flushed, cleaned and water treated as applicable.
- C. Lubrication and fluid levels shall be checked prior to equipment start-up. Alignment on all motor driven equipment shall be checked and adjusted prior to start-up.
- 3.3 BALANCING AND ADJUSTMENTS
- A. General: All building control and automation systems and equipment installed on the project shall be balanced and/or adjusted to provide proper operation or function in accordance with the drawings, specifications, and manufacturer's recommendations. The balancing and/or adjusting shall be completed prior to the system testing specified herein. All calibration, testing, and adjusting will be witnessed by the Owner's building engineer. Systems and equipment for which certification of balancing and adjusting is required, include, but are not limited to:

1. General: When all equipment start-up has been performed and the systems are ready for operation, the Contractor shall perform the following steps of control adjustment and balance. (By mechanical contractor)
 2. Adjustment and Calibrate: All thermostats, dampers, operators, controllers, and other devices shall be adjusted and calibrated as required to put the BCAS in proper working order as designed and specified.
 3. Zone Control: Measure, adjust, and record the control set points and control signal output at full cooling, calibration point, full bypass, and minimum and maximum heating when applicable.
 4. Cold Deck Control: Measure and record the control signal output and air temperature with minimum cold deck airflow and maximum cold deck airflow.
 5. Single Zone Air Handling Unit: Measure and record controller output signal at full cooling, minimum cooling, minimum heating, and maximum heating. Verify operation of all auxiliary controls such as outside air damper and firestat.
- B. Certification: Submit four (4) copies of a letter certifying that the BCAS is properly and fully installed and fully adjusted and calibrated to operate as specified to the Engineer for review to final acceptance.
- C. Completion Reports: Before the final inspection but after all testing, balancing, and adjusting, the Contractor shall furnish all labor, materials and devices necessary to prepare a completion report. (Refer also to Section 23 05 93).

3.4 BCAS TESTING AND CERTIFICATION

- A. A complete BCAS checkout and test shall be performed by the BCAS Contractor to demonstrate and certify that the BCAS is 100% operational and adjusted upon completion of the installation, and that it complies with all applicable codes and specification requirements. The system checkout and test shall be performed within thirty (30) days of the completion of system installation, adjustment, and commissioning. Testing shall be performed by the BCAS Contractor in two (2) parts and two-way radios for use by test observers shall be provided. The first part of the test shall be a full test of all system components, function, and alarms. All affected subcontractors shall participate in this test. All tests shall be witnessed and acknowledged by written signature of the Owner's Building Engineer. Test results shall be certified and submitted to the Engineer. This test shall be the basis for the System Acceptance document specified in this Section. The second part of the test shall be a demonstration of basic system functions and alarms for the Engineer and Owner's Representative, and the Commissioning Agent. Consult Specification Section 20 08 00 and Division 01 for complete details of all required Commissioning Testing to be supported and conducted by this Division and other related Divisions. Costs associated with all required inspections and testing by the Commissioning Specifications and all other specifications related to operation and functioning of the completed project shall be included in this Scope of Work. Additional charges will not be accepted.
- B. This Contractor shall coordinate the test schedule with the General Contractor, Commissioning Agent, Electrical Contractor, Mechanical Contractor, Fire Protection Contractor, Fire Alarm Contractor, and other Contractors required to be present for a complete and functional test.

- C. The system checkout and test shall be a comprehensive 100% inspection and functional test of all equipment and software and shall include, but not be limited to, the following:
1. Verification of manual and program control of all start/stop and alarm points, including status indication and alarms.
 2. Verification of all controlled points including setpoint and actual point readouts, remote setpoint change and point alarm.
 3. Verification that all system annunciation text and messages are correct and appropriate.
 4. Functional test of the normal and emergency power building start-up and shutdown routines.
 5. Testing to verify that all systems on emergency power operate as specified in the sequence of operation.
 6. Testing to verify that all control functions specified in the sequence of operation are provided and fully functional as specified and required.
 7. Testing to verify that all specified software is provided and fully implemented.
 8. Test and verify interoperability between specified systems (lighting controls, HVAC controls, central plant controls, etc.)
 9. Display and demonstrate such data entry template and show site specific customizing capability. Demonstrate parameter changes.
 10. Execute menu tree.
 11. Display graphics, demo update.
 12. Execute digital and analog commands in English and graphic mode.
 13. Demonstrate all specified diagnostics.
 14. Demonstrate DDC loop precision and stability via trend logs of inputs and outputs (six loops minimum).
 15. Demonstrate BCAS performance via trend logs and command printouts.
 16. Demonstrate scan, update, and alarm responsiveness.
 17. Other testing required by Section 25 05 93.
- D. Fire Alarm System Interface Testing: Testing of the BCAS interface with the fire alarm system for smoke management, air handling unit shutdown, fire/smoke damper control, duct smoke detector annunciation and other specified interfaces shall be coordinated with the Division 28 fire alarm testing and certification.
- E. Emergency Power Operation Testing: Testing of BCAS operation under emergency shall be coordinated with the Division 26 Contractor such that the testing is conducted along with the Division 26 emergency power system testing and certification.

3.5 SYSTEM ACCEPTANCE

- A. The BCAS Manufacturer shall issue a report upon completion stating that the system is complete, has been adjusted, has had all hardware and software functions verified, and is operating in accordance with the specifications. Any deviations from specified settings or operations necessitated during system adjustment shall be specifically noted. A demonstration of complete system operation shall be made to the Engineer and Owner's Representative.
- B. Upon receipt of a detailed punch list from the Engineer or Owner's Representative, an installation inspection report shall be prepared by the BCAS Contractor showing, by

system, each outstanding item on the punch list. After all items appearing on the installation inspection report are completed, a second written request for system approval shall be made to the Owner's Representative. As each or all items are approved, an appropriate notation shall be entered on the system report at the time of joint inspection, with counter signature by the Owner's Representative and date. A copy of this report shall be made for the Owner's Representative.

- C. Where it is required for the BCAS Contractor to modify, alter, add, or remove hardware or software programs of the building automation system or related accessories for the purpose of eliminating punch list items, off-line operation and testing to implement them shall be done as required by the BCAS Contractor until such time acceptance performance of the building automation system has been established.
- D. Problems that occur within hardware or software shall be corrected in an appropriate fashion under guarantee. Any such occurrence shall not void previous approval; however, the BCAS Contractor shall be responsible to attend to and remedy such items within a reasonable amount of time. Appropriate logs, schedules, and reports shall be maintained to reflect these items and their redress.

3.6 OWNER INSTRUCTION

- A. General: This Contractor and appropriate factory-trained representatives shall instruct the Owner's personnel in the proper operation and maintenance of all systems and equipment and shall explain all warranties.
- B. Outline: Prior to instruction of Owner Personnel, prepare a typed outline, listing the subjects that will be included in this instruction.
- C. Certification: At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the approved outline to signify that he has a proper understanding of the operation and maintenance of the systems.
- D. Operator Training: Provide sixteen (16) hours of training encompassing:
 - 1. Sequence of operation review.
 - 2. Sign on - Sign off.
 - 3. Selection of all displays and reports.
 - 4. Commanding of points, English, and graphic mode.
 - 5. Modifying English text.
 - 6. Modifying alarm limits and start-stop times.
 - 7. System initialization.
 - 8. Download and initiation of data control points.
 - 9. Purge and/or dump of historical data.
 - 10. Use of portable operator's terminal.
 - 11. Troubleshooting of sensors (determining bad sensors).
 - 12. Creating and modifying color graphics.
- E. Supervisor Training: Provide an additional sixteen (16) hours of training encompassing:
 - 1. Password assignment/modification.

2. Operator assignment/modification.
3. Operator authority assignment/modification.
4. Point disable/enable.
5. Terminal data segregation/modification.

F. Programmer Training: Provide up to an additional twenty-four (24) hours of training, at the Owner's discretion, encompassing:

1. Software review of Sequence of Operation programs.
2. Modification of control programs.
3. Add/Delete/Modify data points.
4. Use of diagnostics.
5. System maintenance procedures.
6. Review of initialization.
7. Upload/download and off-line archiving of all system software.

G. Operator and Supervisor Training shall be in a classroom format at the project site and shall be scheduled at the Owners convenience. Class size shall be approximately but not limited to eight per session.

H. Provide Owner eight (8) hours additional training eight (8) months after final acceptance to ensure proper operation of the BCAS during dissimilar weather conditions.

I. Training sessions shall be conducted in a classroom environment with sufficient "hands on" instruction for the attendees to become familiar and competent with the tasks demonstrated. Training may be video taped by Owner at Owner's discretion.

J. Other Requirements: Refer to other Division 25 Sections for additional Operator Training requirements.

3.7 WARRANTIES AND GUARANTEES

A. General: Contractor shall guarantee all material and equipment installed by him against defects in workmanship and material and provide service for a period of one (1) year after final acceptance of the work by the Owner and he shall repair or replace any materials or equipment developing such defects within that time, promptly on due notice given him by the Owner and at Contractor's sole cost and expense.

B. Service shall be accomplished, and guarantee fulfilled by qualified employees of the BCAS Contractor.

C. Warranty servicing shall include, but not limited to, the following:

1. Replacing defective parts and components as required.
2. Servicing by factory-trained and locally employed service representative of system contractor.
3. Maintaining of system programming to ensure application programs operate in accordance with the original sequence of operation.

3.8 INSTALLATION

- A. General: Install system and materials in accordance with manufacturer's instructions, roughing-in drawings, and details on the Drawings. All components and appurtenances shall be installed in accordance with the manufacturer's instructions, as shown, and as specified. All necessary interconnections, services, and adjustments required to prepare the building for interface to the BCAS shall be furnished. All electrical work shall be in accordance with Division 26. Instrumentation grounding as necessary to preclude ground loops and noise from adversely affecting equipment operations shall be installed. Final adjustment shall be performed by specially trained personnel in the direct employ of the manufacturer of the BCAS.
- B. Electrical Wiring: Refer to the applicable Sections of Division 26 for electrical wiring and raceway installation requirements.
- C. Mechanical Work: Refer to the applicable Sections of Division 23 and Division 25 for the installation of wells, valve bodies, and dampers in mechanical systems.
- D. I/O Summary Tables shall be used in conjunction with the Drawings to identify the hardware required for each building control and automation system.
- E. All temperature control and automation materials shall be applied and installed per the manufacturers' recommendations.
- F. Remote bulbs shall be flange mounted in ductwork and casings and mounted with separable sockets in pipes and tanks. Where installed through insulation, flanges and sockets shall have extension necks to finish flush with the insulation surface.
- G. All sensing elements for supply air temperature in ductwork or casings shall be averaging type with sensing length of number of elements to measure air temperature through the entire cross section of the duct or casing.

3.9 DDC PANEL AND ENCLOSURE LOCATIONS

- A. General: Direct Digital Control (DDC) panels and enclosures, controllers, status/monitoring panels and other control panels shall be located where shown on the Drawings or as close to the controlled equipment as is feasible. Provide panels and enclosures for all NAC and other components of the BMCS, which are susceptible to physical or environmental damage.
- B. Location: Panels and enclosures shall be located so as to provide adequate clearance for maintenance and shall not interfere with maintenance or code clearances for other equipment. Floor plan drawings showing the proposed locations of all control panels shall be submitted for approval.
- C. Interior panels and enclosures shall meet, at minimum, the following requirements:
 - 1. NEMA 1 rated painted steel panels with locking door.
 - 2. Ventilated to prevent excessive heat build-up, where required.
 - 3. Field cabling shall be terminated on a terminal strip fixed within the enclosure. Provide strain relief, as necessary.

4. Internal components shall be installed to allow easy access for diagnostics, maintenance, removal, or replacement of any component within the enclosure.
 5. Cabling shall be neatly installed within wire guides with removable covers for easy access.
- D. Interior panels and enclosures within plenum areas shall meet, at minimum, the following requirements:
1. NEMA 1 painted steel panels with locking door.
 2. Field cabling shall be terminated on a terminal strip fixed within the enclosure. Provide strain relief, as necessary.
 3. Internal components shall be installed to allow easy access for diagnostics, maintenance, removal, or replacement of any component within the enclosure.
 4. Cabling shall be neatly installed within wire guides with removable covers for easy access.
- E. Exterior and garage mounted panels and enclosures shall meet, at minimum, the following requirements:
1. NEMA 4 painted steel panels with locking door.
 2. Field cabling shall be terminated on a terminal strip. Provide strain relief, as necessary.
 3. Internal components shall be installed to allow easy access for diagnostics, maintenance, removal, or replacement of any component within the enclosure.
 4. Cabling shall be within wire guides with removable covers for easy access.
- F. Panels and enclosures shall be located as follows:
1. Central Plant.
 2. Mechanical Rooms.
 3. Pump Room.
 4. Main Electrical Room.
 5. Penthouse Electrical Room.
 6. Selected Electrical Rooms in the parking levels.
 7. Stair Pressurization Fan Room.
- G. Mounting: Panels and enclosures shall be wall mounted or freestanding as required by the location and available space. Provide miscellaneous metals and unistrut supports as necessary to support freestanding panel locations.
- H. Coordination: Panel location shall be coordinated with the Division 26 Contractor so that there is adequate lighting and convenience outlets at the panel location for panel use and maintenance.
- I. Security: All panels shall be lockable with the same key, which shall be unique to the building. Provide the Owner with six (6) keys.
- 3.10 CONTROL POWER CIRCUIT SOURCES
- A. General: Control power circuit sources are provided by Division 26 where shown to BCAS panel locations and at other locations shown on the Electrical Drawings. Control

power transformers creating control power circuits are typically provided in motor starters on the project. All other control power circuit sources required by Division 25 shall be provided by Division 26 at the expense of Division 25.

- B. Coordination: Control power circuit requirements and source locations shall be coordinated with the Division 26 contractor. This Contractor shall be responsible for any additional costs incurred to provide the required control power circuit sources. Input to the Division 26 Contractor shall include, but not be limited to:
1. Locations requiring control power.
 2. Voltage, phase, and ampacity.
 3. Power type, normal or emergency
 4. Type of connection.

3.11 BCAS WIRING INSTALLATION

- A. General: All wiring required for a complete and operational building control and automation system shall be provided by this Division.
- B. All line voltage control wiring and low-voltage control wiring shall be installed in conduit. Low voltage wiring to HVAC terminal unit controllers, HVAC terminal unit temperature sensors, and the field level communications cable may be installed in concealed accessible locations using UL-listed plenum rated cable installed without a raceway. Cable shall not be installed without a raceway when exposed in the building, or in inaccessible locations (except individual sensor drops in drywall partitions). The main BCAS trunk LAN cabling shall be routed in conduit.
- C. All low voltage control wiring which is routed through concealed accessible locations shall be UL-approved low smoke producing jacketed plenum cable. Wiring run without conduit shall be properly supported from the building structure on maximum 5' centers and shall not depend upon the ceiling grid for support.
- D. Line and low voltage control wiring shall not be installed in the same conduit and control wiring shall not be installed in the same conduit with power wiring.
- E. All conduit in exposed locations shall be run in a neat manner and shall be perpendicular and parallel to building lines. Coordinate conduit routing with field conditions so as not to interfere with code clearances for other equipment, maintenance access and walkways.
- F. Flexible metal conduits and liquid-tight flexible metal conduits shall not exceed 3' in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.
- G. All conduit and control wiring in concealed locations shall be installed in an orderly manner, generally perpendicular and parallel to building lines.
- H. Permanently mark terminal blocks for identification. Protect all circuits to avoid interruption of service due to short-circuiting or other conditions. Line-protect from lightning and static electricity all wiring that comes from external sources to the site.

- I. All BCAS conduit freeway shall be marked with yellow paint at 8'-0" o.c. All junction box covers shall be painted yellow.
- J. Label or code each field wire at each end. Permanently label or code each point of all field terminal strips to show the instrument or item served. Color-coded cable with cable diagrams may be used to accomplish cable identification. The following table is provided for reference. Alternate color and identification schemes may be acceptable:

CABLE	COLOR IDENTIFICATION
LAN	PURPLE
BACNET	ORANGE
MODBUS	BLUE
INPUTS	YELLOW WITH PURPLE STRIPE
OUTPUTS	TAN WITH BLUE STRIPE

- K. Signal Transmission System wiring shall be installed as follows:
 - 1. Splices in shielded cables shall consist of terminations and the use of shielded cable couplers. Termination shall be in accessible locations. Cables shall be harnessed with cable ties.
 - 2. Fit all equipment contained in cabinets or panels with service loops, each loop being at least 12" long. Equipment for fiber optics system shall be rack-mounted, as applicable, in ventilated, self-supporting, code gauge steel enclosure. Cables shall be supported for minimum sag.
 - 3. Keep cable runs as short as possible. Allow extra length for connecting to the terminal board.
 - 4. Do not bend flexible coaxial cables in a radius less than ten times the cable outside diameter.
 - 5. Use vinyl tape, sleeves, or grommets to protect cables from vibration at points where they pass around sharp corners, through walls, panel cabinets, etc.
 - 6. Grounding shall be in accordance with NFPA 70. All ground wire shall be insulated conductors.
 - 7. Ground wire shall be run to service entrance ground.
 - 8. To prevent ground loops, conduit grounds shall be isolated from EMC panels by non-metallic couplings approved for installation in air plenums.
- L. Refer to applicable Division 26 Sections for additional requirements for conduit and wiring materials and installation. All conduit and wiring shall be installed in accordance with all applicable requirements of the National Electrical Code and the city authorities having jurisdiction.

3.12 EQUIPMENT INSTALLATION

A. Temperature Instruments:

- 1. Temperature Instruments: When a temperature sensor/transducer is installed in pipes or is susceptible to corrosion and vibration, the sensor shall be installed in a stainless steel thermowell. Temperature sensors/transducers used for space temperature sensing shall include a housing suitable for wall mounting.

Temperature sensor/transducers used for outside air sensing shall have an instrument shelter to minimize solar effects, and shall be mounted to minimize building effects. Assemblies shall be readily accessible and installed in a manner as to allow easy replacement without special tools. Mount duct sensors/transducers in locations to sense the correct temperature of the air only, within the vibration and velocity limits of the sensing element. Mount extended surface element, when used, securely within the duct and position to measure the average temperature. Thermally isolate elements from bracket and supports to respond to air temperature only. Securely seal duct penetrations.

2. Sensor Locations: Sensors shall be wall mounted in office areas; approximate locations are shown on the Drawings. Locate sensors to sense average return air temperature in the space monitored. Submit Drawings showing proposed locations of space and return air temperature sensors to the Engineer for review.
3. Temperature Switches: Temperature switches shall be installed as specified for temperature sensors. Temperature switches shall be adjusted to the proper setpoint and shall be verified by calibration. Switch contact ratings and duty shall be selected in accordance with NEMA ICS 1.
4. Relative Humidity Sensors/Transducers: Relative humidity sensors/transducers shall have air guards when installed in air flows of more than 50 fpm across the sensor element.

B. Pressure Instruments:

1. Pressure Sensors/Transducers: Pressure sensors/transducers (all types) installed on liquid lines shall have isolation and drain valves. Pressure sensors/transducers installed on steam lines shall have isolation and drain valves and siphons. All pressure sensors shall have valves for isolation, venting, and taps for calibration. Pressure sensors/transducers shall have nulling valves.
2. Pressure Switches: Pressure switches (all types) installed on liquid lines shall have drains. Pressure switches installed on steam lines shall have drains and siphons. All pressure switches shall have valves for isolation, venting, and taps for calibration. Pressure switches shall be adjusted to the proper setpoint, and shall be verified by calibration. Pressure switches shall be mounted higher than the process connection. Differential pressure switches shall have nulling valves. Switch contact ratings and duty shall be selected in accordance with NEMA ICS 1.

C. Flow Instruments:

1. Flow Meters: Flow meters shall be installed in accordance with ASME Fluid Meters, and the manufacturer's recommendations for flow accuracy.
2. Venturi Tubes: Venturi tubes shall be installed in horizontal pipe runs. Venturi tubes shall be installed for ease of accessibility for periodic maintenance and as recommended by the manufacturers for flow accuracy.
3. Turbine Meters: Turbine meters shall be installed so that the sensor is located in the center of the fluid flow pipe on the main axis and as recommended by the manufacturers for flow accuracy.
4. Flow Switches: Flow switches shall be installed in such a manner as to minimize any disturbance in the flow of fluid while maintaining reliable operation of the switch.

D. Electric Power Devices:

1. Potential transformers and current transformers shall be installed in cabinets as shown or required.
2. Watt-hour meters, watt-hour demand meters, and current, voltage, and watt-hour transducers shall be installed in cabinets, unless provided in housing by manufacturer.

E. Output Devices:

1. Relays and Contactors: Install relays and contactors in control cabinets or as required.
2. Controllers: Install controller in control cabinets or as required.

F. Position Sensors:

1. End (Limit) Switch: Limit switch type and mounting shall be properly suited for the application to provide reliable switch operation.
2. Potentiometers: Potentiometer type and mounting shall be properly suited for the application to provide reliable operation.
3. Instrument Shelters shall be installed with bottom 4' above the supporting surface using legs and secured rigidly to minimize vibrations from winds. Instrument shelters shall be oriented facing north.

- G. Carbon Dioxide (CO₂) Sensors: Install the CO₂ sensors in accordance with the manufacturer's written installation instructions and project design drawings. System checkout, start-up, calibration, and testing shall be performed by a field-service engineer in the direct employ of the BCAS manufacturer.

3.13 FINAL ADJUSTMENT OF EQUIPMENT

- A. General: After completion of the installation, adjust thermostats, control valves, motors, and similar equipment provided as work of this Section. Final adjustments shall be performed by specially trained personnel in the direct employ of the manufacturer of the primary temperature control system.

3.14 OWNERSHIP OF PROPRIETARY MATERIAL

- A. Project specific software and documentation shall become Owner's property at completion of project, including, but not limited to, graphics, record drawings, database, application programming code, application specification control configuration files, required licensed software, and project documentation.

END OF SECTION

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SECTION 25 09 02

PANELS AND CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93
 - 5. Scope of Work - Section 25 05 01

1.2 SCOPE

- A. Provide and install workstations, panels and controllers and associated network interconnections as specified here and as indicated on the Drawings.
- B. Should additional panels and controllers be required to perform the scope of work as indicated on the drawings, the following specifications associated with those shall apply.

1.3 RELATED SECTIONS

- A. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. All Division 25 Sections

PART 2 - PRODUCTS

2.1 GENERAL

- A. Building Control and Automation System (BCAS): Provide a system capable of integrating multiple building functions including equipment supervision and control, alarm management, energy management, and historical data collection and archiving.
- B. Hardware: The BCAS panel and controller hardware shall consist of the following, as required:
 - 1. Network Area Controllers (NAC)
 - 2. Expandable Custom Application Controllers
 - 3. Standalone Application Specific Controllers (ASC)
 - 4. Unitary Controllers (UC)

- C. Expansion: The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, NAC, ASC, and operator devices.
- D. System Architecture: System design shall eliminate dependence upon any single device for alarm reporting and control execution. Each NAC shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

1. Open, Interoperable, Integrated Architectures

- a. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate OBIX (XML), OPC, SNMP, Lon works, BACnet IP, BACnet MSTP, Modbus TCP/IP, Modbus RTU, or proprietary legacy communication protocols in one open, interoperable system.
- b. The supplied computer software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI / ASHRAE™ Standard 135-2001, BACnet and LonMark to assure interoperability between all system components is required. For each LonWorks device that does not have LonMark certification, the device supplier must provide an XIF file and a resource file for the device. For each BACnet device, hardware shall have a BACnet BTL (BACnet Testing Laboratories) listing and the device supplier must provide a PICS document showing the installed device's compliance level. Minimum compliance is Level 3; with the ability to support data read and write functionality. Physical connection of BACnet devices shall be via Ethernet (BACnet Ethernet/IP,) and/or RS-485 (BACnet MSTP) as specified. For each Modbus device supplier must provide a Registry of data points available on the system.
- c. All components and controllers supplied under this Division shall be true "peer-to-peer" communicating devices. Components or controllers requiring "polling" by a host to pass data shall not be acceptable.
- d. The supplied system must incorporate the ability to access all data using standard Web browsers without requiring proprietary operator interface and configuration programs. An Open DataBase Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system database parameter storage. This data shall reside on the Network Data Server for all database access. Systems requiring proprietary database and user interface programs shall not be acceptable.
- e. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer's internal Intranet network. Systems employing a "flat" single tiered architecture shall not be acceptable.

- 1) Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.
 - 2) Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.
- E. Reliability: Standalone NAC shall be able to access any data from, or send control commands and alarm reports directly to any other NAC or combination of panels on the network without dependence upon a central processing device. Standalone NAC shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device.
- F. Remote Access / Network Security: Controls manufacture shall provide secure remote access to the Building Automation System (BAS).
1. Secure remote access to the BAS shall be available anywhere, anytime, using a compatible client device (PC/tablet/phone).
 2. Secure remote access to the BAS shall be maintained by controls manufacturer.
 3. Secure remote access to the BAS shall not require additional software to be installed on the client device (i.e. VPN client).
 4. Secure remote access to the BAS shall not require ANY inbound ports on a firewall to be "exposed" or "forwarded".
- G. Microcomputer based distributed control processors located in DDC panels and application specific controllers shall interface directly with sensors, actuators, and environmental delivery systems (i.e., HVAC units, chillers, lighting distribution systems, etc.). Functionality to be implemented at the NAC level shall include:
1. Individual input/output point scanning, processing and control
 2. Direct digital control
 3. Alarm detection and storage
 4. Time, event and holiday scheduling
 5. Bus communications interface and control
 6. Local operator terminal interface
 7. Central operator terminal interface
 8. Trend data acquisition and storage
- H. Analog and digital input and output points shall be resident in NAC and application specific controllers. All analog outputs shall be true analog current or voltage outputs. Floating control of digital outputs to provide "analog" outputs will be acceptable for HVAC terminal unit control.
- I. All control functions related to any given smoke management sequence shall be resident in a single NAC or Application Specific Controller or if functions are resident in multiple controller, the smoke management initiation input and verification output shall be hardwired to each controller such that the smoke management functions are maintained with the BCAS communications network out of service.

- J. A Local Area Network (LAN) shall allow data exchange between NAC, and PC operator terminals over BACnet TCP/IP. Direct communications between controllers and the operator terminals shall not be dependent on any other bus connected processor.
- K. All system components shall be designed and built to be fault tolerant, including, but not limited to:
 - 1. Satisfactory operation without damage at 110% above and 85% below rated voltage and a ± 3 Hz variation in line frequency.
 - 2. Static, transient, and short circuit protection on all inputs and outputs.
 - 3. Communications lines protected against incorrect wiring, static transients, and induced magnetic interference.
 - 4. Bus connected devices to be ac-coupled or equivalent so that any single device failure will not disrupt or halt bus communication.
 - 5. All real time clocks and data file RAM to be battery backed for a minimum of 48 hours.
- L. All computer operated system components receiving 120 Volt power from the building power systems shall include integral surge protection devices (SPD) for protection.
- M. All software, real time graphics and accessory hardware required by the following specifications and the performance standards of other sections of this Division.

2.2 DDC HARDWARE

A. NETWORK AREA CONTROLLER - (NAC)

- 1. This contractor shall supply one or more Network Area Controllers (NAC) as part of this contract. Number of area controllers required is dependent on the type and quantity of devices being integrated to the system.
- 2. The Network Area Controller (NAC) shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:
 - a. Calendar functions
 - b. Scheduling
 - c. Trending
 - d. Alarm Monitoring and routing
 - e. Time synchronization
 - f. Integration of controller data for each applicable protocol
 - g. Network Management functions for all network devices
- 3. The Network Area Controller must provide the following hardware features as a minimum:
 - a. One Ethernet Port - 10/100 Mbps
 - b. One RS-232 port
 - c. One RS-485 BACnet MS/TP port
 - d. One LonWorks Interface Port
 - e. One RS-485 ports (configured for Modbus RTU)

- f. Battery Backup
 - g. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
 - h. The NAC must be capable of operation over a temperature range of -20 to 122°F
 - i. The NAC must be capable of withstanding storage temperatures of between 0 and 158°F
 - j. The NAC must be capable of operation over a humidity range of 5 to 90% RH, non-condensing
- 4. The NAC shall provide multiple user access to the system and support for ODBC or SQL. A database resident on the NAC shall be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it.
 - 5. The NAC shall support standard Web browser access via the Intranet/Internet.
 - 6. Control equipment and network failures shall be treated as alarms and annunciated.
 - 7. Alarm actions may be initiated by user defined programmable objects created for that purpose.
 - 8. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.
 - 9. 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.
 - 10. Provide a "query" feature to allow review of specific alarms by user defined parameters.
 - 11. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.
 - 12. An Error Log to record invalid property changes or commands shall be provided and available for review by the user

B. EXPANDABLE CUSTOM APPLICATION CONTROLLERS

- 1. General:
 - a. Expandable Custom Application controllers shall be capable of providing control strategies for the system based on information from any or all connected inputs. The program that implements these strategies shall be completely flexible and user-definable. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site though simple download are not acceptable. Changing global strategies using firmware changes is also unacceptable. Program execution of controller shall be a minimum of once per second.
 - b. Equipment Controllers shall be BTL listed BACnet Application Specific Controller (B-ASC) or BACnet Advanced Application Controller (B-AAC), as appropriate for the purpose of the controller.
 - c. Provide means to graphically view inputs and outputs on each program block in real-time as program is executing. This function may be performed using the operator's terminal or field computer.
 - d. The onboard, 7 day battery-backed real-time clock must support schedule operations and trend logs.

- e. Global control algorithms and automated control functions should execute using 32-bit processor.
 - f. Controller operating conditions shall be between -67°F to 203°F temperature and 5% to 100% RH (non-condensing) humidity.
 - g. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
 - h. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° F to 158° F.
 - i. Controller shall include both onboard 10Base-T/100Base-TX Ethernet BACnet communication over UTP and shall include BACnet IP communication. In addition, controller shall include BACnet Point-to-Point (PTP) connection port.
 - j. The base unit of the controller shall host expansion modules with various I/O combinations. These inputs and outputs shall include universal inputs, binary outputs, and analog outputs (0-10V or 0-20mA). Inputs shall support 3K and 10K thermistors, 0-5VDC, 0-10VDC, 4-20mA, dry contacts, dedicated static pressure input, and pulse inputs directly.
 - k. This item is basically for unreliable unit controller that need HOA switches.
 - l. Provide custom application controllers as required to comply with remainder of Division 25 specifications.
2. Schedules: Each custom application controller shall support a minimum of 50 BACnet Schedule Objects.
3. Logging Capabilities:
- a. Each controller shall support a minimum of 25,000 samples. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
 - b. Controller shall periodically upload trended data to system server for long-term archiving if desired.
4. Alarm Generation:
- a. Alarms may be generated within the system for any object change of value or state (either real or calculated). This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
 - b. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site using remote communications.
 - c. Controller must be able to handle up to 200 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.
5. Serviceability: Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

C. APPLICATION SPECIFIC CONTROLLERS - (ASC)

1. The BCAS Contractor shall provide Application Specific Controllers necessary to fulfill the project requirements per the specifications. ASC shall be freely programmable with pre-packaged operating sequences maintained in EEPROM or flash RAM.
2. Equipment Controllers shall be BTL listed BACnet Application Specific Controller (B-ASC) or BACnet Advanced Application Controller (B-AAC), as appropriate for the purpose of the controller.
3. The ASC shall be a node on one of the Automation LANs and shall control its own communications so that the failure of any one node, shall not inhibit communications on the network between the remaining nodes.
4. ASC shall be totally independent of other LAN nodes for their monitoring and control functions.
5. Provide each ASC with flash memory or EEPROM for the protection of volatile memory. Batteries on ASCs are not acceptable.
6. All associated applications programs shall reside at the ASC. ASC shall not require communication to any other panel for normal operating sequences other than time scheduled base commands.
7. Control shall be based on either three term algorithms, i.e. proportional plus integral plus derivative, or two term algorithms, i.e., proportional plus integral, unless specified otherwise.
8. Provide with each controller the BACnet configuration information including BIBB, address, controller configuration type, etc. to integrate the controller into the CMCS.
9. For future expansion and flexibility, the controller shall have either on board or through expansion, 20 hardware input/output points. Expansion points must communicate with the controller via an internal communications bus. Expansion points must be capable of being mounted up to 650ft. (200 m) from the controller. Expansion points that require the BACnet network for communication with the controller are not allowed.
10. Serviceability: Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
11. Application Descriptions:
 - a. Fan Powered (FPTU) and Variable Air Volume (VAV) Terminal Unit Controllers:
 - 1) FPTU/VAV Terminal Unit Controllers shall support, but not be limited to, the control of the following configurations of terminal units to address current requirements as described in the Sequence of Operation section of this specification, and for future expansion:
 - a) Single duct only (cooling only or cooling with reheat).
 - b) Fan powered (series/on-off logic, dynamic fan speed).
 - c) Supply/Exhaust.

- 2) The modes of operation supported by the Terminal Unit Controllers shall minimally include, but not be limited to, the following:
 - a) Day/Weekly schedules (may be via DDC panels)
 - b) Comfort/Occupancy mode.
 - c) Economy mode (standby mode, unoccupied, etc.).
 - d) Temporary override mode.
- 3) Occupancy-based Standby/Comfort Mode Control: Each Terminal Unit Controller shall have a provision for occupancy sensing overrides. Based upon the contact status of either a manual wall switch or an occupancy sensing device, the Terminal Unit Controller shall automatically select either Deadband or Comfort mode to minimize the heating and cooling requirements while satisfying comfort conditions.

b. Fan Coil Unit (FCU) Controllers:

- 1) FCU Controllers shall support, but not be limited to, the control of the following configurations of terminal units to address current requirements as described in the Sequence of Operation section of this specification, and for future expansion:
 - a) Single duct only (cooling only or cooling with reheat).
 - b) Fan powered (series/on-off logic, dynamic fan speed).
 - c) Supply/Exhaust.
- 2) The modes of operation supported by the FCU Controllers shall minimally include, but not be limited to, the following:
 - a) Day/Weekly schedules (may be via DDC panels)
 - b) Comfort/Occupancy mode.
 - c) Economy mode (standby mode, unoccupied, etc.).
 - d) Temporary override mode.
- 3) Occupancy-based Standby/Comfort Mode Control: Each FCU Controller shall have a provision for occupancy sensing overrides. Based upon the contact status of either a manual wall switch or an occupancy sensing device, the FCU Unit Controller shall automatically select either Deadband or Comfort mode to minimize the heating and cooling requirements while satisfying comfort conditions.

D. UNITARY CONTROLLERS - (UC)

1. Unitary Controllers shall support, but not be limited to, the following types of systems to address specific applications described in the Sequence of Operation section of this specification, and for future expansion:
 - a. Heat pumps.

- b. Small package RTU's.
- 2. Unitary controllers shall support the following types of point inputs and outputs:
 - a. Economizer Switchover Inputs:
 - 1) Dry bulb.
 - 2) Outdoor air enthalpy.
 - 3) Differential temperature.
 - 4) Binary input from a separate controller.
 - b. Economizer Output:
 - 1) Integrated analog with minimum position.
 - 2) Binary output to enable self-contained economizer actuator.
 - c. Heating and Cooling Outputs:
 - 1) One to three stages.
 - 2) Analog output with two-pipe logic.
 - 3) Reversing valve logic for heat pumps.
 - d. Fan Output:
 - 1) On/Off logic control.
- 3. Unitary Controllers shall support the following library of control strategies to address the requirements of the sequences described in the Sequence of Operation section of this specification, and for future expansion:
 - a. Daily/Weekly schedules (may be controlled via DDC controllers).
 - b. Comfort/Occupancy mode.
 - c. Economy mode.
 - 1) Standby mode/economizer available.
 - 2) Unoccupied/Economizer.
 - 3) Shutdown.
 - d. Temporary Override Mode:
 - 1) Temporary comfort mode (occupancy-based control).
 - 2) Boost (occupant warmer/cooler control).
- 4. Occupancy-based Standby/Comfort Mode Control: Each Unitary Controller shall have a provision for occupancy sensing overrides. Based upon the contact status of either a manual wall switch or an occupancy sensing device, the Unitary Controller shall automatically select either standby or comfort mode to minimize the heating and cooling requirements while satisfying comfort conditions.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 25 09 03

DAMPERS, VALVES AND ELECTRONIC CONTROL AND AUTOMATION HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Start-up, Testing, Adjusting, and Balancing - Section 23 05 93
 - 5. Scope of Work - Section 25 05 01

1.2 SCOPE

- A. Provide all dampers, valves and electronic control and automation hardware required for a complete and fully functional Building Control and Automation System (BCAS).

1.3 RELATED SECTIONS

- A. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. All Division 25 Sections

1.4 QUALITY ASSURANCE

- A. Manufacturers:
 - 1. Provide principal control and automation system equipment and materials produced by the BCAS Manufacturer. All equipment shall be supplied by and be the responsibility of that manufacturer.
 - 2. Where the BCAS Manufacturer does not have all required equipment available, provide sensors, transducers, switches, and similar equipment and material produced by one of the following:
 - a. ABB (Taylor)
 - b. Barton
 - c. Bristol
 - d. Data Industrial Corporation
 - e. Dwyer
 - f. Foxboro
 - g. Kele and Associates

- h. McDonnell and Miller
 - i. Mercoïd
 - j. Onicon
 - k. Pre-Con Corporation
 - l. Veris Industries
 - m. Equal to be Submitted and Approved
 - 3. Where the BCAS Manufacturer does not have all required equipment available, provide control valves, actuators, and similar equipment and materials produced by one of the following:
 - a. Belimo Air controls, Inc
 - b. Equal to be Submitted and Approved
 - 4. Where a specific manufacturer and model number is listed in the specifications, the specific product shall be provided, or an equal product meeting all characteristics and quality of listed product.
- B. Electrical Standards: Provide electrical products which have been tested, listed and labeled by Underwriters' Laboratories, Inc. (UL) and which comply with National Electrical Manufacturers' Association (NEMA) standards.
- 1. Local Control Panels and Standalone Controls used to sequence dampers and control equipment associated with the Fire Alarm smoke purge sequence shall have the following UL listing:
 - a. UL 864 UDTZ (Smoke Evacuation)
 - b. UL 864 UUKL (Smoke Evacuation)
 - c. UL 916 PAZX
 - 2. Equipment that is not listed for Smoke Removal/Evacuation may not be used to sequence dampers, Air Handlers and Exhaust Fans without hardwired interlocks to the Fire Alarm System.
- C. Accuracy Standards:
- 1. Sensing elements and associated controllers or readout devices shall be field-adjustable to provide the minimum operating throttling range possible without control loop hunting. Variation from control point setting through the full control range shall be no more than ½ the throttling range. Space temperature control throttling range shall not exceed 2°F and overall control system accuracy (end-to-end) shall be as listed below from set point for each control function, including the control element, wiring, relays, submaster devices, and similar items. All accuracy's defined as percentage shall be percentage of the actual reading within the specified range:
 - a. ± 1.0°F for space temperature in the 0 to 130°F range.
 - b. ± 1.0°F for duct temperatures in the 40 to 130°F range.
 - c. ± 1.0°F for outside air temperatures in the -30 to 230°F range.
 - d. ± 1.0°F for water temperatures in the 30 to 230°F range.

- e. $\pm 0.25^{\circ}\text{F}$ for water temperatures used in BTU calculations.
 - f. $\pm 1\%$ for KWH and kW monitoring.
 - g. $\pm 5\%$ for relative humidity in the 5 to 95% range.
 - h. ± 0.1 inch for static pressure in the 0 to 5 inch water gauge range.
 - i. ± 0.1 inch for filter status differential in the 0 to 2 inch range.
 - j. $\pm 1\%$ for air flow from 10 to 150% of maximum flow.
 - k. $\pm 2\%$ for water flow from 10 to 150% of maximum flow.
 - l. $\pm 2\%$ for differential water pressure from 10 to 150% of maximum flow.
 - m. ± 50 ppm for Carbon Monoxide readings.
 - n. ± 50 ppm for Carbon Dioxide readings.
2. Accuracy standards for individual sensors, transducers, devices, and systems shall be as specified for the individual components and systems.

1.5 SUBMITTALS

- A. Refer to Schedule of Submittal Data, Section 25 05 04.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide temperature control products in the size, capacities, and quality indicated by these Specifications and as required, conforming to manufacturer's standard materials and components as published in their product information, designed and constructed as recommended by the manufacturer, and as required for the application indicated or required. These Specifications shall be considered minimum standards in all situations.
- B. Provide all sensors, thermostats, relays, switches, control valves, dampers, operators, instrumentation, and other devices required for operation and interface of the Building Control and Automation System (BCAS).

2.2 MISCELLANEOUS MATERIALS

- A. Ionization Smoke Detectors: These detectors shall be provided under Division 28. Coordinate all installation work. Verify proper compliance with the requirements of NFPA 90A.

2.3 AUTOMATIC VALVES/ACTUATORS

- A. General: Provide factory-fabricated two-way or three-way valves with two position or modulating control actuators of the type, body material, and pressure class required for each application. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements. Valve pressure class and rating shall be selected based on maximum pressure and temperature in the piping system in which it is installed.
- B. Performance: All valves shall conform to the following minimum standards and selection requirements.

1. Valves shall be guaranteed to have a Class 5 shut off rating.
 2. Maximum pressure drop at design flow shall be 5 psi or as noted on the Drawings.
 3. Provide heavy-duty actuators, with proper close-off rating for each individual application.
 4. The valve assembly shall be suitable for throttling control and for tight shut-off against pump shut-off head. All valves shall be certified by an authorized officer of the manufacturer to shut-off bubbletight against full system pump shut-off head.
 5. All valves which are operated in sequence with damper motors, control switches, or other valves shall sequence properly without overlap. Provide positive positioners, oversized operators, or balanced trim if required for proper sequence control.
 6. Valve schedules submitted for review shall clearly show shift in operator span for all valves operated in sequence and shut-off capability for all valves.
 7. Zone valves shall be sized to meet the control application and they shall maintain their last position in the event of a power failure.
- C. Valve Types: Control Valves ½" to 6": The BCAS contractor shall furnish all specified motorized control valves and actuators. BCAS contractor shall furnish all control wiring to actuators. The Division 23 Contractor shall install all valves. Equal Percentage control characteristic shall be provided for all water coil control valves. Linear valve characteristic is acceptable for 3-way valves 2½ inches and above.
1. Globe Valves: Hydronic system globe valves shall have the following characteristics (Used for VAV Coils, FCU's, Hot Water Coils, and office building and school AHU coils. You will still need to have an autoflow circuit setter upstream for T&B):
 - a. NPS 2 (DN 50) and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
 - b. NPS 2-1/2 (DN 65) and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
 - c. Internal Construction: Replaceable plugs and stainless-steel or brass seats.
 - 1) Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
 - 2) Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.
 - d. Sizing: 5-psig (35-kPa) maximum pressure drop at design flow rate or the following:
 - 1) Two Position: Line size.
 - 2) Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.
 - 3) Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.

- e. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
 - f. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.
2. Pressure Independent Characterized Control Valves (PICCV): Forged brass body rated at no less than 400 psi, chrome plated brass ball and stem, female, NPT union ends. For all PICCV, 2" and smaller, up to 100 GPM. Refer to drawings for specified PICCV locations.
- a. The modulating control valves shall be pressure independent.
 - b. The control valve shall accurately control the flow from 0 to 100% full rated flow with an equal percentage flow characteristic. The flow shall not vary more than +/- 5% due to system pressure fluctuations across the valve with a minimum of 5 PSID across the valve.
 - c. Combination of actuator and valve shall provide a minimum close-off pressure rating of 200 PSI.
 - d. The control valve shall require no maintenance and shall not include replaceable cartridges.
 - e. The actuator shall be directly coupled to the valve at the factory.
 - f. Running time shall be 100 seconds independent of the flow setting while rotating a maximum of 90 degrees.
 - g. The actuator shall have a separate feedback wire, which will be capable of sending a signal back to the controller. This signal will translate to the actual flow (gpm) of the associated coil, which will be in direct relation to the magnitude of the feedback voltage.
 - h. All pressure independent characterized control valves shall be sized by the maximum coil capacity in GPM, not by the conventional CV method.
 - i. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.
 - j. Balancing valves are not needed when using Pressure Independent Characterized Control Valves (PICCV).
 - k. Manufacturer shall be Belimo or approved equal.
3. Butterfly Valves: Where indicated on the Drawings or required by the Sequence of Control, utilize full lug butterfly-type control valves rated for the same operating pressure as the piping system in which such valves are installed. Valve construction shall be as specified in Section 23 05 10. Valves shall have Class 5 shut-off rating against either side of the valve when the flange is removed from the opposite side. Provide positive positioners or oversized operators if required for proper sequence control.
4. Differential Bypass Valves: Valves for control of differential bypass systems shall be of industrial quality with minimum 50:1 range ability, equal percentage characteristics, cast iron body, 316 stainless steel trim, position indicator, heavy duty operator, stainless steel stem, Teflon spring-loaded packed, and removable or non-removable cage type trim. All working parts (trim) of the valve shall be replaceable without removing the valve body from the line.

5. Steam Valves: Body and trim materials shall be in accordance with manufacturer's recommendations for design conditions and service with linear ports for modulating service. Sizing criteria:
 - a. Two-position service: pressure drop 10% to 20% of inlet psig.
 - b. Modulating service: 100 kPa (15 psig) or less; pressure drop 80% of inlet psig
 - c. Modulating service: 101 to 350 kPa (16 to 50 psig); pressure drop 50% of inlet psig.
 - d. Modulating service: over 350 kPa (50 psig); pressure drop as scheduled on plans.
- B. Modulating Control Operators: Provide all modulating control valves 2-1/2" and larger and all size butterfly valves with a positive positioning power device. Such device shall operate independently of valve spring range or stem friction to ensure the repetition of valve position when related to the same signal increment value of controller output. Positioner sensitivity shall be sufficient to produce a stem travel reversal loss not exceeding 7% of the controller output range as it goes from its full to no-load position within its proportional band operation. Provide positioners whenever required to obtain close-off ratings or proper sequencing of valves with damper operators, relays or other valves.
- C. Fail Position: Chilled water valves shall be normally open and hot water valves shall be normally open or normally closed as specified in the Sequence of Operation.
- D. Valve Selection: All valves shall be suitable for the maximum design pressure of the system in which they are installed.
 1. Valves shall be selected to provide tight-closing shut-off without chatter against the maximum pressure which can be encountered in the system in which they are installed.
 2. Modulating valves shall be sized by the BCAS Manufacturer for fully modulating operation. Where valve size is smaller than line size, coordinate installation of increasers and reducers with the Division 23 Contractor. Line size transitions shall be provided at no additional cost to the Owner.
 3. Two position valves shall be full line size with properly sized internal passages.
 4. Water valves shall be sized with a minimum pressure drop equal to the pressure drop of the coil or heat exchanger served and a maximum pressure drop of 5 psi. Relief and bypass valves shall be sized according to the pressure available.

2.2 AUTOMATIC DAMPERS

- A. General: Provide factory-fabricated opposed blade-type automatic control dampers as shown on the Drawings or required by the Sequence of Operation.
- B. Construction: Dampers shall have galvanized bar or channel steel frames which are the full size of the duct or opening in which the damper is installed. Frames on dampers over 4 square feet shall have corner bracing. Damper frames shall be minimum 14 gauge formed galvanized steel with mounting holes for enclosed duct mounting, where applicable. Fabricate of not less than 16 gauge steel with corrosion-resistant galvanized

finish. Damper blades shall have a maximum width of 8" and a maximum length of 48". All dampers shall be provided with nylon or oilite bearings, stainless steel or elastomer side seals, and zinc-plated hardware as standard. Axles shall be a minimum of 1/2" diameter and be locked to the blade with rivets or be welded. Blades shall have a minimum of four brakes. All blades on each damper section shall be interconnected to act in unison. Provide neoprene, vinyl polyester, or polyurethane blade edging. Maximum leakage rate through a 48" x 48" closed damper shall not exceed 10.0 cfm per square foot of damper face area at 2.5" of water pressure differential and a maximum closing torque of 50 inches/pounds. Damper leakage ratings shall be certified in accordance with AMCA Standards.

- C. Damper Sizing: Modulating dampers shall be sized according to approach velocities, pressure drops, and similar criteria to obtain linearized characteristics. Maximum approach velocity shall be 1800 feet/minute. Damper free area shall be sized by the BCAS Manufacturer. Provide necessary blank-off plates between damper leaves to obtain the required free area. Damper sizing shall be submitted to the Engineer for approval.
- D. Operating Temperature Range: Range shall be from -40°F to 180°F.
- E. Operators: Dampers shall be normally closed unless otherwise specified, and shall be opened by actuators with sufficient power to open the damper as installed. Operators shall be as specified herein.
- F. Operating Linkage: Linkage shall be factory-assembled and shall be capable of withstanding a load equal to twice the maximum operating force of the damper operator without deflection.

2.3 ELECTRONIC CONTROL AND AUTOMATION HARDWARE

A. ELECTRONIC ACTUATORS

- 1. General: Provide fully proportioning electronic actuators of either the push-pull or rotary type, as required. Actuator motor shall be of the low voltage synchronous type and shall be non-overloading at a continuous stall. Provide each motor with corrosion protection. Actuators for outside air and exhaust applications shall have nonferrous motor housings and stainless steel shaft and linkage. Actuator control signal shall be 24-volt ac, 0-10 volts, 2-wire phase cut or three point floating as required.
 - a. Provide spring return for normally open/closed positioning. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.
 - b. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered.
- 2. Selection: Size electronic actuators to operate their appropriate dampers and valves with sufficient reserve power to provide smooth modulating or two-position action as specified. Actuators shall be Underwriters Laboratories Standard 873

listed. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque.

3. HVAC Terminal Unit Actuators: Where required by the Sequence of Operation, electronic actuators shall be suitable for use with the terminal unit controllers and terminal unit control dampers provided on the project. Coordinate provisions for actuator mounting with the HVAC terminal unit manufacturer selected for the project.

B. TEMPERATURE SENSORS

1. General: Provide temperature sensors for space, duct, immersion, duct averaging, remote probe, and outside air applications.
 - a. DDC temperature sensors shall be of the 500 ohm, 1,000 ohm, or 3,000 ohm platinum type, or 10,000 ohm thermistor type. All sensors of a particular category shall be of the same type manufacturer and shall have an interchangeability of $\pm 0.1\%$ at the reference temperature. Sensors shall provide high accuracy, long term stability, low hysteresis, fast response and a wide operating range.
 - b. Sensor time constant response to temperature change time shall be less than 3 seconds per degree change. Sensors requiring field-calibration shall not be acceptable. All sensors shall be precise and accurate so that they do not require adjustments or calibrations. Linearizing, (ranging and resistance change versus temperature curve interpretations, where required) shall be made by software programming.
 - c. Minimum sensor operating ranges shall be as follows:
 - 1) Chilled Water: 30°F to 100°F
 - 2) Condenser Water System 30°F to 150°F
 - 3) Air Systems 0°F to 150°F
 - 4) Space 30°F to 100°F
 - 5) Outside Air 50°F to 120°F
 - d. Sensor accuracy shall be $\pm 0.1\%$ at 32°F for platinum sensors and $\pm 0.4^\circ\text{F}$ for thermistor sensors or as required to achieve overall system accuracy (end-to-end) as stated hereinbefore.
2. Wall-Mounted Space Sensors: As specified in the sequence of operations, provided wall sensor with setpoint adjustment capability.
 - a. Standard wall sensor shall use solid-state sensor and shall be packaged in aesthetically pleasing enclosure. Sensor shall provide override function, warmer/cooler lever for set point adjustment and port for plug-in of Field Service Tool for field adjustments. Override time shall be stored in controller and be adjustable on a zone-by-zone basis. Adjustment range for warmer/cooler lever shall also be stored in EEPROM on controller. All programmable variables shall be available to Field Service Tool through wall sensor port.
 - b. Temperature adjustment capability shall be enabled/disabled on a zone-by-zone basis through the BCAS. Temperature adjustment

- device/lever shall not have permanent markings on face of sensor indicating adjustment capability.
- c. Sensor shall include push-button device for after-hours occupancy override setting. Override shall be enabled/disabled on a zone-by-zone basis through the BCAS. Override setting duration shall be initially programmed for 60 minutes (adjustable by zone or globally). Override function shall activate enough terminal units on the floor to ensure a stable load on the air handling unit. The program shall be written to energize the air handling unit serving the terminal unit, if it is not already. Likewise, a signal shall be sent out to the central plant to activate a chiller and its associated equipment if not already in operation. An alarm message shall record when a Tenant activates his HVAC System for after-hours use. Run time shall be accumulated for each Tenant and automatically input into the BCAS billing spreadsheet separated by Tenant. Local override shall be tied into web-based Tenant override scheduling and reporting system.
3. **Wireless Zone Sensors:** In lieu of space temperature or intelligent room sensors, wireless zone sensors shall be specified as specified in the sequence of operations.
- a. Battery life shall be 15 years or greater to minimize the need for battery replacement in typical operating conditions.
- b. To check for proper operation, wireless space temperature sensors shall include a signal strength on the space sensor display.
- c. To allow local troubleshooting without specialized tools, error codes shall be displayed on the digital display. Error codes shall include: not associated, address to 000, improper software configuration, input voltage too high, or general sensor failure. Codes shall be indicated on inside of sensor back cover.
4. **Duct Sensors:** Provide flanged or threaded probe type sensors designed for duct type mounting. Sensor shall be encapsulated in a stainless steel probe 8" long. Sensors shall include a suitable junction box for terminating sensor wiring and shall include a lagging protrusion where installed in externally insulated ducts. Sensor shall be ACI T2 thermistor, or approved equal.
5. **Immersion Sensors:** Provide Immersion type sensors with a ½" OD threaded fitting for direct installation in a thermowell. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed. The well must withstand the flow velocities in the pipe. Sensors shall include a suitable junction box for terminating sensor wiring. Wells for insulated piping shall have a 2-1/2" lagging protrusion. Locate wells so the sensing probe will give a true and correct reading. Install wells so as not to cause undue restriction in small piping. Where wells are located in pipe lines 1-1/2" and smaller, provide a section of pipe of such diameter that the net area of the pipeline will not be reduced by the thermometer well. All wells shall be filled with silicon and complete with caps and chains. Wells shall be installed in a 45-degree angle into the direction of water flow in the monitored piping. Sensor shall be ACI T2 thermistor, or approved equal. Temperature probes and wells shall have the following insertion lengths:

PIPE DIAMETER	INSERTION ORIENTATION	LENGTH
4"	HORIZONTAL	2-1/2"
4", 6"	VERTICAL	4-1/2"
6", 8"	HORIZONTAL	4-1/2"
8", 10"	VERTICAL	6-1/2"
>8"	HORIZONTAL	6-1/2"
>10"	VERTICAL	10"

6. Duct Averaging and Coil Leaving Air Averaging Sensors: Provide extended flexible probe averaging sensors for coil discharge temperature applications. Averaging sensors shall be a minimum of 5 ft in length per 10 ft² of duct cross section. Sensors shall include a suitable junction box for terminating sensor wiring and be installed in a serpentine fashion. Sensor shall be ACI T2 thermistor.
7. Outside Air Sensors: Provide shielded, weatherproof outside air sensors with sensing elements encapsulated in a nominal 2" stainless steel sheath suitable for outdoor applications. Sensors shall include a waterproof junction box or conduit body for terminating sensor wiring and a removable sun shield. Provide two sensors each located in separate monitoring locations. Sensor shall be equal to Dwyer Model RHP-2011.

C. TEMPERATURE TRANSDUCERS

1. General: Provide temperature transducers consisting of a temperature sensor and a solid-state signal conditioner to provide a 4-20 mA or 0-10 volts dc true linear output corresponding to temperature. The signal conditioner shall be factory-calibrated and provided with zero and span trimmers for output adjustment.
2. Accuracy: Sensor accuracy shall be $\pm 0.1\%$ at 32°F for platinum sensors and $\pm 0.4^\circ\text{F}$ for thermistor sensors or as required to achieve overall system accuracy (end-to-end) as stated herein before.
3. Configurations: Temperature transducers shall be provided in configuration as specified hereinabove for TEMPERATURE SENSORS.

D. THERMOSTATS/TEMPERATURE SAFETIES

1. Electric Type: Electric space thermostats shall be two position space thermostats with a SPST or SPDT switch activated by a bimetal sensing element, direct or reverse acting as required. The thermostat range shall be adjustable for 50°F to 65°F with a removable external adjustment knob. Each thermostat shall have a blank, impact resistant locking cover.
2. Proportional-Acting Room Thermostats: Proportional-acting thermostats shall have precision wound potentiometers that will give a variable voltage output directly proportional to temperature sensed. Thermostats shall have one or two potentiometers as necessary for the required sequence; and when two potentiometer types are required, potentiometers shall act in unison or in sequence as required. Thermostats shall have a range of approximately 55°F to 85°F, a throttling range of 3°F to 8°F, and adjustable stops. Provide locking-type covers without thermometers or external-adjusting device.

3. Freeze Protection Switches (Freezestats): Switches shall consist of a manual reset, line voltage, bellows activated switch with a 20' long sensing bulb and 4' capillary installed in a serpentine fashion. The sensor shall be responsive to the coldest section of the capillary. Switch contact shall open when the air temperature along any point on the capillary falls below 35°F (adjustable). Provide double pole switches where required by the Sequence of Operation. Sensor shall be Kreuter Model 3017, or equal.
4. Low-Limit Thermostat: Low-limit airstream thermostats shall be UL listed, vapor pressure type, with an element of 20 ft minimum length. Element shall respond to the lowest temperature sensed by any 1 ft section. The low-limit thermostat shall be manual reset only.
5. Safety Temperature High Limit Switches (Firestats): Switches shall consist of a manual reset, line voltage, bimetal activated switches set to operate at 135°F (adjustable from 100°F to 250°F). Switches shall be UL-labeled. Switch contacts shall open when the air temperature exceeds 135°F. Provide double pole switches where required by the Sequence of Operation. Sensor shall be Kete Model TC-100-1A-3C, or equal.

E. HUMIDITY TRANSDUCERS

1. General: Provide space, duct, remote probe and outside air humidity transducers consisting of a solid-state humidity sensor and a solid*-state signal conditioner to provide a 4-20 mA or 0-10 volts dc true linear output corresponding to relative humidity (RH). Transducers shall not require periodic maintenance or calibration and shall not be affected by high airflow, dust, moisture saturation or power interruption.
2. Accuracy: Transducers shall provide long-term stability and low hysteresis with an accuracy of $\pm 3\%$ over a 20-80% RH range for room and duct / 20%-95% RH range for Outdoor Air humidity sensors RH range with $\pm 0.5\%$ RH repeatability and a maximum 30 second response time for a 50% RH change. Humidity sensor's drift shall not exceed 1% of full scale per year.
3. Space Transducers: Provide transducers designed for wall mounting in occupied areas. Transducer shall be installed in a self-contained nonmetallic enclosure and shall be mounted to the wall with tamperproof screws. Enclosures for space humidity transducers shall be identical in appearance to enclosures for space temperature sensors. Sensor shall be Dwyer Model RHTL-W, or equal.
4. Duct Transducers: Provide self-contained flanged or threaded probe type sensors designed for duct mounting. Transducers shall include a suitable junction box for terminating transducer wiring and shall include a lagging protrusion where installed in externally insulated ducts. Sensor shall be Dwyer Model RHTL-D, or equal.
5. Outdoor Air Transducers: Provide weather-sheltered sensors with a weatherproof junction box containing the signal conditioner and provision for terminating transducer wiring. Transducer assembly shall be suitable for outdoor applications. Sensor shall be equal to Dwyer Model RHP-2011.

F. PRESSURE TRANSDUCERS

1. General: Provide pressure transducers for converting duct differential and static pressure, water/steam pressure, water differential pressure and pneumatic supply/branch pressures to analog output signals.

2. Duct Differential and Static Pressure Transducers: Provide transducers to convert static pressure signals from static pressure probes and airflow measurement devices to 4-20 mA or 0-10 volts dc analog outputs. Pressure shall be sensed by a solid-state pressure sensor which is mounted directly to the transducer enclosure and not physically attached to the transducer circuit board. The transducer shall be designed for operation with unfiltered monitored air and shall not be affected by mounting orientation, vibration or temperature. Transducer accuracy shall be $\pm 1.0\%$ with linearity of $\pm 0.1\%$, repeatability of $\pm 0.1\%$ and hysteresis not exceeding $\pm 0.1\%$. Transducers shall be factory-calibrated and shall have zero and span trimmers for field calibration. Transducers shall be provided with a steel enclosure for panel mounting or a NEMA 1 enclosure for remote mounting, a direct or reverse acting output, as required and a square root output for linearization, where required. Transducer range shall be selected to match the medium being monitored. Transducers shall be Mamac Systems Model PR-272 or an approved equal. Provide flange mounted aluminum duct static pressure sensing probes as required for monitoring duct static pressure. Probes shall be Dwyer MS Series or approved equal.
3. Water Pressure Transducers: Provide transducers to convert water pressure to 4-20 mA or 0-10 volts dc analog outputs. Pressure shall be sensed by a solid-state pressure sensor that is mounted directly to the transducer enclosure and not physically attached to the transducer circuit board. The transducer shall be designed for operation with unfiltered monitored media and shall not be affected by mounting orientation, vibration or temperature. Transducer accuracy shall be $\pm 1.0\%$ with linearity of $\pm 0.1\%$, repeatability of $\pm 0.1\%$ and hysteresis not exceeding $\pm 0.1\%$. Transducers shall be factory-calibrated and shall have zero and span trimmers for field calibration. Transducers shall be provided with a steel enclosure for panel mounting or a NEMA 1 enclosure for remote mounting, a direct or reverse acting output, as required and a square root output for linearization, where required. Transducer range shall be selected to match the medium being monitored. Transducers shall be Dwyer 628 Series or approved equal.
4. Water Differential Pressure Transducers: Provide transducers to convert differential pressures to 4-20 mA or 0-10 volts dc analog outputs. Pressure shall be sensed by a solid-state pressure sensor that is mounted directly to the transducer enclosure and not physically attached to the transducer circuit board. The transducer shall be designed for operation with unfiltered monitored media and shall not be affected by mounting orientation, vibration or temperature. Transducer accuracy shall be $\pm 1.0\%$ with linearity of $\pm 0.1\%$, repeatability of $\pm 0.1\%$ and hysteresis not exceeding $\pm 0.1\%$. Transducers shall be factory-calibrated and shall have zero and span trimmers for field calibration. Transducers shall be provided with a steel enclosure for panel mounting or a NEMA 1 enclosure for remote mounting, a direct or reverse acting output, as required and a square root output for linearization, where required. Transducer range shall be selected to match the medium being monitored. Transducers shall be Veris PW2, Dwyer 629 Series, or approved equal.
5. Sensors installed in all liquid lines shall have an isolation valve and pigtail siphon installed between the sensor and its pressure source.

G. AIR FLOW TRANSDUCERS

1. Air Monitoring Stations: Provide air monitoring stations where indicated on the Drawings or required by the Sequence of Operation.
 - a. Each airflow measuring station shall measure airflow by means of a network of static and total pressure sensors factory-positioned and connected in parallel to produce an averaged velocity pressure. The measured velocity pressure converted to airflow (cfm) shall have an accuracy within 2% of the full scale throughout the velocity range from 700 to 4000 fpm when measured under laboratory conditions. The location of air monitoring stations shall meet manufacturer's guidelines so as to approach laboratory conditions.
 - b. The maximum resistance to air flow shall not exceed 0.6 times the velocity head. The unit shall be suitable to withstand up to a temperature of 250°F.
 - c. Airflow measuring stations shall be of heavy gauge metal construction and shall be furnished with an air velocity treatment, air straightening section with an open face area of not less than 97%.
 - d. Provide separate transducers, with integral square root extraction where applicable, to convert air monitoring station differential pressure to a 4-20 mA or 0-10 volt dc analog signal.
 - e. Provide local readout display at each Air Flow Measuring Station.
 - f. Air Monitoring Stations shall be Kele KMS series. Transducers shall be Modus T30 Series.
- H. CARBON DIOXIDE (CO₂) SENSORS: Carbon Dioxide sensors shall measure CO₂ in PPM in a range of 0-2000 ppm. Accuracy shall be +/- 3% of reading with stability within 5% over 5 years. Sensors shall be duct or space mounted as indicated in the sequence of operation. Sensors requiring more than one calibration per five-year period shall include sensor calibration kit/ software/etc. and provide owner instruction of calibration procedure during training and at end of warranty period. Approved sensors are TRANE 4190-4100 and Vaisala GMW21.
- I. CARBON MONOXIDE (CO) METERS/TRANSDUCERS: Provide CO meter/transducer units to monitor CO levels using a maintenance free, solid state sensor and a solid state signal conditioner to provide a three digit local display of monitored CO level in ppm (0 to 400 ppm range) and a linear 4-20 mA analog output proportional to the monitored CO level in ppm. Readings shall be updated every 2-1/2 minutes. The Transducer and signal conditioner shall be mounted in a common NEMA 1 enclosure with the local display concealed inside the enclosure. Transducers shall be Kele & Associates Model WCO-1 or an approved equal. Provide one Model CM-FCK calibration kit and one spare transducer to the Owner at project substantial completion.
- J. WATER FLOW TRANSDUCERS
 1. Insertion / Inline Turbine Flow Meters: Provide insertion type flow sensors as specified herein, where indicated on the Drawings, and as required by the Sequence of Operations.
 - a. Each flow metering system shall consist of a flow sensor installed in a pipe saddle or thread-o-let and an analog flow transmitter to provide a 4-20 mA or 0-10 volts DC flow signal to the BCAS.

- b. The flow sensor shall be constructed of 316 stainless steel and nonmetallic wetted parts and shall be designed for hot tap installation in a 1" NPT pipe saddle or thread-o-let. The sensor shall be suitable for use in pipe sizes from 1-1/4" to 40". Sensors installed in pipe size 2-1/2" and larger shall have two turbines. A multi-bladed flow wheel shall provide a flow signal to the flow transmitter. The sensor design shall be such that it is not affected by metallic or rust particles as found in metal piping systems. The sensor shall be adjustable to provide the manufacturers recommended insertion depth in the pipe being sensed. The sensor shall be suitable for pressures up to 400 psi and temperatures up to 220°F.
- c. The analog flow transmitter shall convert the flow sensor output to an analog flow input to the BCAS.
- d. The flow sensor shall be installed with a minimum of twenty upstream and ten downstream pipe diameters of straight pipe for uninterrupted flow and shall have an accuracy of $\pm 3\%$ at flow velocities from one foot (1') to 30' per second with $\pm 0.1\%$ repeatability and $\pm 1\%$ linearity.
- e. Insertion type meters shall be provided at locations specified and where shown on the drawings.
- f. Insertion flow metering systems shall be Onicon F-1110/F-1210, or an approved equal.

K. POSITION/STATUS INDICATORS

- 1. End (Limit) Switches: Limit switches shall be of the sealed or enclosed type as required for the application. Contacts shall be snap-action SPDT rated for the application. Damper end switches shall be industrial quality, shaft-mounted, enclosed switches set to sense open or closed position of damper blades. Switches shall be arranged to prevent "open-center" operation and for mounting as required. Switch enclosures shall be waterproof with a conduit entry seal where subject to moisture or water.
- 2. Potentiometers: Potentiometers may be either rotary or linear, depending on application of each position indicator. Position potentiometers shall have a linearity of +5% and shall indicate position on a percent open basis.
- 3. Key-Operated Switches: Hand-off automatic (H-O-A), off-automatic, and all similar use switches shall be key-operated with all switches keyed alike where switches are not located in access limited locations. All switches shall be rated for a minimum of 600 Volt ac, 5-A, and shall be mounted in an enclosure as specified or shown.
- 4. Current Sensitive Relays: Relays shall provide a self-powered, isolated SPDT contact closure to indicate a run condition of monitored equipment. The relay shall have contacts rated at 1 amp at 120 Volt ac, adjustable sensitivity and an adjustable operating point to match the current draw of the monitored equipment. Current sensitive relays shall be Veris H-800 or an approved equal.
- 5. Liquid Level Switches: Switches shall consist of a SPDT snap acting switch operated by a sealed float mechanism. Switch body shall be stainless steel and shall be suitable for mounting through a 1-1/2" thread-o-let. Float switches shall be KELE F7-SS or an approved equal.
- 6. Waterflow Sensors: Provide industrial quality thermal dispersion water flow sensor with 316 stainless steel wetted parts, vapor-proof construction with seal at conduit entry, rated for 300 psig, 300°F, and voltage and current ratings as

- required. Sensors shall be thread-o-let or tee mounted and shall be IFM Efector solid state remote flow monitoring system or approved equal
7. Differential Pressure (DP) Water Flow Switches: Switches shall be double bellows type differential pressure switches with brass bellows directly actuating a snap-acting DPDT switch. Switches shall have visible setpoint adjusters. Switches exposed to weather shall be weatherproof. Switch ranges and setpoints shall be appropriate to the manufacturer's recommendations for the pressure at the point of application and the differential pressure being monitored. Differential pressure water flow switches shall be McDonnell and Miller, or approved equal.
 8. Pressure Switches: Switches shall be brass button bourdon tube operated with a snap-acting switch directly activated by the bourdon tube. Switches shall have a repetitive accuracy of $\pm 1\%$ of their operating range and shall withstand up to 150% of rated pressure. Switch actuation shall be adjustable over the operating pressure range. Switches shall have snap-action DPDT contacts rated for this application. Switches exposed to weather shall be waterproof. Switch ranges and setpoints shall be appropriate to the manufacturer's recommendations for pressures at the point of application. Pressure switches shall be Dwyer or approved equal.
 9. Differential Pressure (DP) Air Flow Switches: Switches shall be diaphragm operated to activate a DPDT snap switch. Motion of the diaphragm shall be transmitted to the switch button by means of a direct mechanical linkage. Switches shall be rated for pressures up to 50" WG and shall have 16-gauge steel, zinc-plated, dichromate dipped housing suitable for the environment in which the switch is installed. Switches exposed to unconditioned outside air and weather shall be moisture resistant. Switches exposed to weather shall have weatherproof housing. Switches shall have silicone rubber power and sealing diaphragms with aluminum supports and stainless steel calibration springs. Switch repetitive accuracy shall be 1% minimum. Switch ranges and setpoints shall be appropriate to the manufacturer's recommendation for the pressure drop across the equipment being monitored. Differential pressure air flow switches shall be Dwyer or approved equal.
 10. Static Pressure Safety Switches: Switches shall be duct or unit mounted and shall consist of a manual reset static pressure sensitive diaphragm operated switch that is adjustable for positive or negative pressure actuation. When the switch pressure setpoint is exceeded, the switch contacts shall open.

L. OUTPUT DEVICES

1. Control Relays: Control relay contacts shall be rated for the application, with a minimum of two sets of SPDT contacts, enclosed in a dustproof enclosure. Relays shall be rated for a minimum life of one million operations. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays shall be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Control relays shall be Tyco, Veris, or approved equal.
2. Time Delay Relays: Time delay relay contacts shall be rated for the application with a minimum of two sets of SPDT contacts, enclosed in a dustproof enclosure. Relays shall be rated for a minimum life of one million operations. Relays shall be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Delayed contact opening or closing shall be adjustable from

- one (1) to 60 seconds with a minimum accuracy of $\pm 2\%$ of setting. Time delay relay shall be Veris or approved equal.
3. Latching Relays: Latching relay contacts shall be rated for the application with a minimum of two sets of SPDT contacts, enclosed in a dustproof enclosure. Relays shall be rated for a minimum life of one million operations. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays shall be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Catching relays shall be IDEC or approved equal.
 4. Reed Relays: Reed relays shall be encapsulated in a container housed in a plastic, epoxy, or metal case. Contacts shall be rated for the application. Operating and release times shall be 1 millisecond or less. Relays shall be rated for a minimum life of 10 million operations and shall be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage.
 5. Contactors: Contactors shall be of the single coil, electrically operated, mechanically or electrically held type. Positive locking shall be obtained without the use of hooks, latches, or semi-permanent magnets. Contacts shall be double break silver-to-silver type protected by arcing contacts where necessary. Number of contacts and ratings shall be selected for the application. Operating and release times shall be 100 milliseconds or less. Contactors shall be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage.
 6. Solid State Relays: Input-output isolation shall be greater than 1000 megohms with a breakdown voltage of 1500 Volt root mean square or greater at 60 Hz. Relays shall be rated for a minimum life of 10 million operations. The ambient temperature range shall be at least -20°F to $+140^{\circ}\text{F}$. Input impedance shall not be less than 500 ohms. Relays shall be rated for the application in accordance with NEMA ICS 1. Operating and release times shall be one millisecond or less. Transients shall be limited to 150% of control voltage. Solid state relays shall be Kele Model RSSDN or approved equal.

M. ELECTRICAL POWER INSTRUMENTS

1. Potential Transformers: Potential transformers shall be in accordance with ANSI C57.13.
2. Current Transformers: Current transformers shall be in accordance with ANSI C57.13.
3. Watt-Hour Meters: Watt-hour meters, with or without demand register shall be in accordance with ANSI C12 and have pulse initiators for remote monitoring of watt-hour consumption. Pulse initiator shall consist of Form C contacts with a current rating not to exceed 2 amperes and voltage not to exceed 500 volts, with combinations of VA not to exceed 100 VA, and a life rating of one billion operations. Meter sockets shall be in accordance with ANSI C12.
4. Watt-Hour Meters With Demand Register: Meters shall be in accordance with ANSI C12 and have pulse initiators for remote monitoring of watt-hour consumption and instantaneous demand. Pulse initiators shall consist of Form C contacts with a current rating not to exceed 2 amperes and voltage not to exceed 500 volts, with combinations of VA not to exceed 100VA, and a life rating of 1 billion operations. Meter sockets shall be in accordance with ANSI C12.
5. Current Transducers: Provide current transducers to convert 0 to 5 amperes input signals from standard current transformers to 4-20 mA or 0-10 volts dc

analog signals with an accuracy of $\pm 0.5\%$ of CT rating. The transducer shall be factory-calibrated and provided with zero and span adjustments. Transducers shall be installed in dust tight metal enclosures with provisions for terminating current transformer and transducer wiring. Transducer shall be a Mamac Systems Model CU-230 or an approved equal.

6. Voltage Transducers: Provide voltage transducers to monitor three phase voltages on 208 or 480 Volt systems and provide discrete 4-20 mA outputs which are linear for each phase-to-phase voltage. Transducer shall be suitable for mounting in a NEMA 1 enclosure and shall have an accuracy of $\pm 0.25\%$ of full voltage scale. Transducer shall be a Kele & Associates Model PVM-348 or an approved equal.
7. KW and KWH Transducers: Provide kilowatt and kilowatt-hour transducers to convert potential transformer or phase voltage outputs and current transformer current outputs to 4-20 mA outputs proportional to load kW and a pulsed output for kWh consumed. Transducer accuracy shall be $\pm 2.0\%$ at unity power factor and $\pm 2.5\%$ at 0.5 power factor. Transducer shall be provided with a NEMA 1 enclosure, a disconnect switch and current transformer shorting assembly, a phase monitor feature with digital outputs for loss of power, loss of voltage on any phase and undervoltage, and a kWh consumption and demand meter readout kit with LED or LCD readouts. kW and kWh transducers shall be EMON DMON, Kele & Associates WHU-238 Series or an approved equal.

N. UNINTERRUPTED POWER SOURCE

1. Provide UPS surge suppression and battery protected outlets on the front end building controller, all programmable controllers, and any server / computer provided
2. Acceptable Manufacturers: Minuteman Entrust UPS.
3. Provide UPS with: automatic voltage regulation, spike and surge protection, and battery backup, all in a surprisingly compact package.
4. Provide UPS with eight total outlets to ensure that all devices in your system can be protected with surge and battery protected outlets.
5. 120/1 Voltage

O. POWER METER

1. The power meter shall be Veris E50H5A or equivalent.
2. The power meter shall be fully electronic with multi-line backlit LCD display showing measured parameters.
3. The power meter shall perform the following measurements:
 - 2.0 Accumulated Real Energy (kWh) for each phase and total of all phases.
 - 2.1 Accumulated Reactive Energy (kVARh) and Apparent Energy (kVAh) totals for all phases.
 - 2.2 Net Present Demand for Real (kW), Reactive (kVAR) and Apparent (kVA) Power over a user-specified interval (block or sliding window).
 - 2.3 Maximum (Peak) Real (kW), Reactive (kVAR) and Apparent (kVA) Demand Intervals.

- 2.4 Instantaneous Real (kW), Reactive (kVAR) and Apparent Power (kVA), by phase and in total.
 - 2.5 Current (amps) for each phase and average of all phases.
 - 2.6 Phase-to-phase voltage for each phase and average of all phase pairs.
 - 2.7 Phase-to-neutral voltage for each phase pair and average of all phases.
 - 2.8 Power factor for each phase and average of all phases.
 - 2.9 AC frequency
4. The power meter shall communicate using the BacNET MS/TP protocol at speeds from 9600 to 115,200 baud (no parity). The meter shall provide a BacNET Device object, a set of writable Analog Value objects for remote configuration, a set of Analog Input objects to provide access to scaled 32-bit measurement values and their unit types, and a set of Binary Input objects for indicating individual alarm conditions.
5. The meter shall be UL/CUL listed to the latest applicable safety standards
6. Power meter models shall accept voltage input over the range of 90 to 600 VAC (50 or 60 Hz).
7. The power meter shall accept 0 to 0.333VAC input from up to three current transducers (U018 Rope Style CTs only) from 20 to 5000 amps.
8. The measured energy consumption shall be retained in non-volatile memory for the life of the product warranty.
9. The power meter shall have demand measurement programmable for up to 6 sub-intervals of 10 seconds to 546 minutes duration.
10. The power meter shall operate from -30°C to +70°C.
11. The power meter shall have dimensions not exceeding 4.2" x 3.6" x 2.3".
12. The power meter shall meet both ANSI C12.20 0.5% and IEC 62053-22 Class 0.5S real power and energy accuracy specifications.
13. The power meter shall meet IEC 62053-22 Class 2 reactive power and energy accuracy specifications.
14. The power meter shall be configurable for operation on Single Phase (AN or AB), Split Phase (ABN), Delta (ABC), and Wye (ABCN) systems.
15. The power meter shall have automatic phase reversal compensation such that it is insensitive to the CT's load orientation.
16. The power meter shall have separate control power inputs such that it may be powered from a different service than it measures.
17. The power meter shall have two user-configurable Pulse Contact inputs to support measurement of other related energy values (gas, water, steam, etc.) over BacNET using simple pulse-output transducers.
18. The power meter shall be configurable for use with potential transformers to 5000 volts.
19. The power meter shall calculate a maximum theoretical system power using the configuration parameters set by the user.
20. The power meter shall support warnings for low power factor (phase current or voltage miss-wired), current over range, voltage over range, and frequency out of range.
21. The power meter shall log and retain in non-volatile memory up to 5760 (up to 60 days at 15 minute intervals) measurement records at time intervals determined by the Demand Interval duration setting. These records shall contain any three 32-bit data values that the user selects from the list of supported Analog Input

objects. These logged data records shall be readable over BacNET via three
Trend Log objects.

22. The product shall have a 5-year warranty.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

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SECTION 25 09 16

BUILDING CONTROL AND AUTOMATION SYSTEM (BCAS) SOFTWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Design Criteria - Section 20 05 02
 - 2. Basic Division 20-28 Requirements - Section 20 05 03
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. General Division 20-28 Materials and Methods - Section 20 05 05
 - 5. Startup, Testing, Adjusting, and Balancing - Section 23 05 93
 - 6. Scope of Work - Section 25 05 01

1.2 SCOPE

- A. Provide a complete custom tailored software package with full web integration, custom graphics, clear and concise floor plan graphics with dynamic objects, pull down menus with custom tags, and trend, control, and billing capabilities as specified.

PART 2 - PRODUCTS

2.1 SYSTEM SOFTWARE

A. GENERAL:

- 1. System Graphics: Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using colors to represent zone temperature relative to zone set point.
 - a. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point and-click navigation between zones or equipment, and to edit set points and other specified parameters.
 - b. Graphic imagery – graphics shall use 3D images for all standard and custom graphics. The only allowable exceptions will be photo images, maps, schematic drawings, and selected floor plans.
 - c. Animation. Graphics shall be able to animate by displaying different Image lies for changed object status.
 - d. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
 - e. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only

require widely available no-cost plug-ins (such as Active-X and Macromedia Flash).

2. Custom Graphics:

- a. The operator interface shall be capable of displaying custom graphics in order to convey the status of the facility to its operators.
- b. Graphical Navigation. The operator interface shall provide dynamic color graphics of building areas, systems and equipment.
- c. Graphical Data Visualization. The operator interface shall support dynamic points including analog and binary values, dynamic text, static text, and animation files.
- d. Custom background images. Custom background images shall be created with the use of commonly available graphics packages such as Adobe Photoshop. The graphics generation package shall create and modify graphics that are saved in industry standard formats such as GIF and JPEG.

3. Area and Floor Plan Graphics:

- a. Ariel View of the area served with hyperlinks to each building site like a Google Earth View. May include the customers logo or other identifying trademarks. Clicking on the hyperlink takes the user to the floorplan summary. A summary of ALL floorplans with full 7 color thermal graphics. This view is shown in 2D format. The building would have a 'thumbnail' view of each floorplan on the summary with the reporting 7 color thermal graphics reporting their color. This allows the user to quickly view all zones from one location. Clicking on the floorplans will then direct the user to the floorplan detail.
- b. From the floorplan summary the user can click on any of the floorplans to be directed to the floorplan detail. Each floorplan detail shall contain the following:
 - 1) Floorplan exterior/interior walls
 - 2) Show stairways and other identifying features such as:
 - a) Room numbers and/or room names.
 - b) Actual locations of HVAC Equipment such as Air Handlers, Terminal Units.
 - c) The HVAC equipment shall have hyperlinks such that upon clicking on the link the user is directed to the HVAC equipment directly from the floor plan.
 - d) Space Conditions for each zone at their physical location including temperature, humidity & CO2.
 - 3) Thermal Graphics color (Full Seven Color) Colors as follows:
 - a) Green – At Setpoint
 - b) Light Blue – Below Setpoint Step 1
 - c) Dark Blue – Below Setpoint Step 2
 - d) Yellow – Above Setpoint Step 1
 - e) Brown – Above Setpoint Step 2
 - f) Gray – Unoccupied
 - g) Red – Zone Out of Range (Hi/Lo Temp)
 - h) Purple/Gray – Loss of Comm
 - 4) The thermal graphic color shall be on the bottom such that all text, walls and details are visible thru the thermal color.
 - 5) Ductwork Overlay shall show all walls, stairways and identifiable structures.

- 6) For All Equipment Graphics
 - a) 3D format with cut away views
 - b) Black backgrounds
 - c) One graphic for each piece of equipment
 - d) Standard Animations associated with templated graphics
 - e) Custom Animation for Applied Air Handlers & Central Plants
 - f) Mobile Access Graphics shall be enabled for smart phone & tablet use
 - g) Dashboards shall be provided for the owner to customize.
4. Equipment & Application Pages:
 - a. The operator interface shall include standard pages for all equipment and applications. These pages shall allow an operator to obtain information relevant to the operation of the equipment and/or application, including:
 - 1) Animated 3D Equipment Graphics for each major piece of equipment and floor plan in the System. This includes:
 - a) Each Chiller, Pump, Cooling Tower, Ice System (Build and Melt), AHU, VAV, FCU, Exhaust Fan, etc.. These graphics shall show all points dynamically as specified in the points list.
 - b) Animation capabilities shall include the ability to show a sequence of images reflecting the position of analog outputs, such as valve or damper positions. Graphics shall be capable of launching other web pages.
 - c) Optimization Sequence Points like Critical Valve Tag, Pump Pressure Optimization, Plant Capacity / Efficiency, Chiller Capacity / Efficiency, etc.
 - 2) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.
 - 3) Historical Data (As defined in Automatic Trend Log section below) for the equipment or application without requiring a user to navigate to a data log page and perform a filter.
5. Engineering Units: Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system. Unit selection shall be able to be customized by user to select the desired units for each measurement.
- B. **SYSTEM APPLICATIONS:** The central server shall serve operator interface web pages and provide off-line storage of system information. Provide the following applications within the system.
 1. Automatic System Database Save and Restore. The central server shall store on the hard disk backup tables of data including trends, alarms, custom settings and user profiles. This data shall be backed up once a day. This database shall be updated whenever a change is made in the system. The storage of this data shall be automatic and not require operator intervention.
 2. Manual Database Save and Restore. A system operator with the proper password clearance shall be able to archive the database manually at any time. The system operator shall have the ability to set limits on Alarm Log, Global Point Control Log, System Log, and User Change Log to manage database size.
 3. System Configuration. The central server shall serve web pages as the interface for configuring the operator-level functions of the system. A user with proper security shall be able to configure the system to allow for future changes or additions.

4. On-Line Help and Training. 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 system functions and shall provide the relevant data for that particular screen. Additional help shall be available through the use of hypertext links onscreen.
5. System Security:
 - a. The system shall support state-of-the-art encryption between server and web browser.
 - b. Each operator shall be required to login to the system with a user name and password in order to view, edit, add, or delete data.
 - c. User Profiles shall restrict the user to only the objects, applications, and system functions as assigned by the system administrator.
 - d. Each operator shall be allowed to change their user password.
 - e. The System Administrator shall be able to manage the security for all other users.
 - f. The system shall include pre-defined "roles" that allow a system administrator to quickly assign permissions to a user.
 - g. User logon/logoff attempts shall be recorded.
 - h. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.
 - i. All system security data shall be stored in an encrypted format.
 - j. The system shall support Active Directory for user set-up and management.
 - k. The system shall track and record all user log-in activity and all changes done at the enterprise level including who made the change, when, what was changed, previous value and new value.
6. System Diagnostics: The system shall automatically monitor the operation of all workstations, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.
7. Alarm/Event Notification:
 - a. An operator shall be notified of new alarms/events as they occur while navigating through any part of the system via an alarm icon.
 - b. The operator will have the option of selecting an audible alarm notification for all alarm classes they subscribe to.
 - c. The system operator will have the option of setting specific times and days that that they will receive alarm notifications.
 - d. Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any Enterprise operator web interface.
 - e. The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in a minimum of 4 categories based on severity.
 - f. Alarm/event messages shall use full language, easily recognized descriptors.
 - g. An operator with the proper security level may acknowledge and clear alarms/events.
 - h. All alarms/events that have not been cleared by the operator shall be stored by the building controller.
 - i. The alarm/event log shall include a comment field for each alarm/event that allows a user to add specific comments associated with any alarm.
 - j. Alarm logs shall provide the ability to navigate directly to object with one click.
8. Alarm Processing:
 - a. The operator shall be able to configure any object in the system to generate an alarm when transitioning in and out of a normal state.

- b. The operator shall be able to configure the alarm limits, warning limits, states, and reactions for each object in the system.
- c. The operator shall be able to set up conditional alarm limits based on reference points.

9. User Change Log:

- a. The operator shall be able to view all logged user changes in the system from any operator web interface.
- b. An operator shall be able to group user changes by: date, affected, date & affected, user, date & user, transaction type, date & transaction type, or sort only.
- c. The operator will have the option of additional filtering capability of: date, transaction, type, user, affected, and details that can be used individually or in conjunction with other filters.

10. Data Trend Logs:

- a. Trend Logs Definition:
 - 1) The operator interface shall allow a user with the appropriate security permissions to define a trend log for any data in the system.
 - 2) The operator interface shall allow a user to define any trend log options as described in the Application and Control Software section.
 - 3) Trend intervals of 1, 5, 15, 30, and 60 minutes as well as user-defined intervals shall be selectable.
- b. Trend Log Viewer:
 - 1) The operator interface shall allow Trend Log data to be viewed and printed.
 - 2) The operator interface shall allow a user to view trend log data in text-based (time –stamp/value).
 - 3) The operator shall be able to view the data collected by a trend log in a graphical chart in the operator interface.
 - 4) Trend log viewing capabilities shall include the ability to show a minimum of 5 points on a chart.
 - 5) Each data point trend line shall be displayed as a unique color.
 - 6) The operator shall be able to specify the duration of historical data to view by scrolling and zooming.
 - 7) The system shall provide a graphical trace display of the associated time stamp and value for any selected point along the x-axis.
- c. Export Trend Logs:
 - 1) The operator interface shall allow a user to export trend log data in CSV or PDF format for use by other industry standard word processing and spreadsheet packages.

11. Standard and Custom Reports:

- a. The operator web interface shall provide a reporting package that allows the operator to select reports to run.
- b. The operator web interface shall provide the ability to schedule reports to run at specified intervals of time.
- c. The operator web interface shall provide the ability to email schedule reports at specified intervals of time.

- d. The operator web interface shall allow a user to create reports in either a pdf. or Excel format.
- e. Reports and logs shall be readily printed to the system printer.
- f. The operator web interface shall provide the ability to create and modify both standard and custom reports.
- g. The following standard reports shall be available without requiring a user to manually design the report:
 - 1) All Points in Alarm Report: Provide an on-demand report showing all current alarms.
 - 2) All Points in Override Report: Provide an on-demand report showing all overrides in effect.
 - 3) Site Commissioning Report: Provide a one-time report that lists all equipment with the unit configuration and present operation.
 - 4) Air Handler Status Report: Current status and short historical operation of selected air handlers.
 - 5) Air System Status Report: Current status and short historical operation of selected VAS.
 - 6) Area Status Report: Current status and short historical operation of selected Area.
 - 7) Chiller Plant Status Report: Current status and short historical operation of selected chiller plant.
 - 8) Chiller Status (ASHRAE) Report: Standard points defined by ASHRAE 147-2013 for tracking and operation of air conditioning equipment.
 - 9) Schedules Report: List of all weekly events for all schedules in selected buildings.
 - 10) Space Comfort Analysis Report: List of spaces that meet selected criteria for potential comfort issues (temp variance, high, low, unoccupied).
 - 11) Space List Report: Current status of multiple spaces in selected buildings.
 - 12) Space Status Report: Current status and short historical operation of selected spaces
- h. The following custom report functionality shall be available without requiring a third party reporting tool:
 - 1) Bar Chart: Create a bar chart for any data log or custom report equation in the system.
 - 2) Line Chart: Create a line chart for any data log or custom report equation in the system.
 - 3) Scatter Plot: Create a scatter plot for any data log or custom report equation in the system.
 - 4) Histogram: Create a Histogram for any data log, point, or custom report equation in the system.
 - 5) Pie Chart: Create a Pie chart for any data log, point, or custom report equation in the system.
 - 6) Single Values: Display single values from any point, data log, or equation on a custom report.
 - 7) Values Table: Display a formatted table for point values from any family type (spaces, air handlers, chillers, areas, air systems, chiller plants, or programmable controllers).
 - 8) Data Log Table: Create a formatted table from selected data logs.
 - 9) User Change Log Table: Create a formatted table of user changes with date/time, user, what was changed, new/old value for any family type (spaces, air handlers, chillers, areas, air systems, chiller plants, or programmable controllers).

- 10) Text Box: Create a text boxes that can be placed and sized on any custom report.
- 11) Image: Download and place images that can be placed and sized on any custom report.
- 12) Size and position of ability of all items on a custom report.
- 13) Both standard and custom page size capabilities.
- 14) Save, edit, delete, and save as capability.
- 15) Equation capability on data logs or points that can be used in custom reports.

12. Reports and Logs:

- a. The building operator web interface shall provide a reporting package that allows the operator to select reports.
- b. The building operator web interface shall provide the ability to schedule reports to run at specified intervals of time.
- c. The following standard reports shall be available without requiring a user to manually configure the report:
 - 1) All Points in Alarm Report: Provide an on demand report showing all current alarms.
 - 2) All Points in Override Report: Provide an on demand report showing all overrides in effect.
- d. Commissioning Report: Provide a one-time report that lists all equipment with the unit configuration and present operation.
- e. Provide ASHRAE Standard 147 Report:
 - 1) Chilled Water (or other fluid) inlet and outlet temperature
 - 2) Chilled Water (or other fluid) flow
 - 3) Chilled Water (or other fluid) inlet and outlet pressures
 - 4) Evaporator refrigerant pressure and temperature
 - 5) Evaporator approach temperature
 - 6) Condenser water inlet and outlet temperatures
 - 7) Condenser water flow
 - 8) Condenser refrigerant pressure and temperature
 - 9) Condenser approach temperature
 - 10) Oil pressure and temperature
 - 11) Oil level (if applicable)
 - 12) Compressor refrigerant discharge temperature
 - 13) Compressor refrigerant suction temperature
 - 14) Motor amperes per phase
 - 15) Motor volts per phase
 - 16) Purge exhaust time or discharge count
 - 17) Ambient temperatures (dry bulb and wet bulb)
 - 18) Date and time Data Logged
 - 19) Manual entry field for addition of refrigerant
 - 20) Manual entry field for addition of oil
 - 21) Manual entry field for vibration levels
- f. VAV Air Systems
 - 1) System Mode
 - 2) System Occupancy
 - 3) Ventilation (Outdoor air flow) setpoint
 - 4) Ventilation (Outdoor air flow) status
 - 5) Air Handler Static pressure setpoint

- 6) Air Handler Static pressure status
 - 7) Air Handler occupancy status
 - 8) Air Handler Supply air cooling and heating set points
 - 9) Air Handler minimum, maximum and nominal static pressure setpoints
 - 10) VAV box minimum and maximum flow
 - 11) VAV box drive open and close overrides
 - 12) VAV box occupancy status
 - 13) VAV box Airflow to space
 - 14) Space / Building pressure
- g. Chilled Water Systems (only as applicable at AHU level)
- 1) System mode of the chiller plant
 - 2) Chiller enable/disable status
 - 3) System supply water setpoint
 - 4) System Chilled and Condenser water supply and return temperatures
 - 5) System Chilled and Condenser water pump status
 - 6) Messages as to when an additional chiller will be added or removed from operational sequence
 - 7) Chiller or system failure information
 - 8) Chiller rotation information
 - 9) Override capabilities to force an added chiller, subtract a chiller, or change of sequence.
 - 10) Control to remove a chiller from a sequence temporarily for service purposes.
 - 11) 24-hour dynamic trends of all temperature, dP, AMPS, flows, start/stop and status.
 - 12) Building BTU/Hr consumption (with 24-hour trend at 15 minute intervals).
 - 13) Chilled and condenser water pump speed and applicable points (refer to I/O Table).
 - 14) Cooling tower status, fan speed.
 - 15) Supply condenser water pressure.
 - 16) Cooling tower automatic valve position
13. Workstation Applications Editors: The system web user interface shall support dedicated screens for editing of control system applications. The application programs shall be executed at the appropriate controller panels.
14. Custom Application Programming: Provide tools to create, modify, and debug custom application programming. The operator shall be able to create, edit, and download custom programs at the same time that all other system applications are operating. The system shall be fully operable while custom routines are edited, compiled, and downloaded.
15. Scheduling. A user shall be able to perform the following tasks utilizing the operator web interface:
- a. Create a new schedule, defining the default values, events and membership.
 - b. Create exceptions to a schedule for any given day.
 - c. Apply an exception that spans a single day or multiple days.
 - d. View a schedule by day, week and month.
 - e. Exception schedules and holidays shall be shown clearly on the calendar.
 - f. Modify the schedule events, members and exceptions.
 - g. Create schedules and exceptions for multiple buildings.
 - h. Apply emergency schedule to multiple buildings.
 - i. Drag and drop scheduling editing
 - j. Global schedule and exceptions across multiple buildings

16. Manual Control and Override:

- a. Point Control: Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.
- b. Temporary Overrides: The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.
- c. Override Owners: The system shall convey to the user the owner of each override for all priorities that an override exists.
- d. Provide a specific icon to show timed override or operator override, when a point, unit controller or application has been overridden manually.
- e. Global Point Control. Provide a method for a user to view, override, and edit if applicable, the status of multiple object and properties in the system. The point status shall be available by menu, on graphics or through custom programs.

17. Critical Control:

- a. The operator web interface shall provide a Critical Control package that allows the operator to designate points as critical points.
- b. The operator web interface shall provide the ability to restrict access to who can create, edit, and change critical points.
- c. The operator web interface shall require reentering user name and password when a user with proper rights makes a change to a critical point.
- d. All changes to critical points shall be displayed in the user change log with identification of critical point change and any associated comments.
- e. The operator web interface shall signify a point is a critical point with use of an identifying icon.

2.2 DDC SOFTWARE

A. General:

1. All necessary software to form a complete operating system as described in this specification shall be provided.
2. The software programs specified in this section shall be provided as an integral part of the DDC controller and shall not be dependent upon any higher level computer for execution.

B. Control Software Description:

1. Pre-Tested Control Algorithms: The DDC controllers shall have the ability to perform the following control algorithms:
 - a. Two Position Control
 - b. Proportional Control
 - c. Proportional plus Integral Control
 - d. Proportional, Integral, plus Derivative Control
 - e. Automatic Control Loop Tuning is desirable, but must be easily disengaged.
 - f. On/Off control with differential.
2. Equipment Cycling Protection: Control software shall include a passive provision for limiting the number of times each piece of equipment may be cycled within any one (1) hour period.

3. Heavy Equipment Delays: The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.
4. Power-Fail Motor Restart: Upon the resumption of normal power, the DDC controller shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.
5. Chiller Sequencing: Provide applications software to properly sequence the chiller plant to minimize energy use. This application shall perform the following functions:
 - a. The chiller plant control application shall have the ability to control chillers as detailed in the sequence of operations.
 - b. This application shall be able to control both constant and variable flow systems as well as parallel, series and decoupled piping configurations.
 - c. Diagnostics/Protection: The chiller plant application program shall be able to integrate individual chiller diagnostics into control action decisions.
 - d. Event Processing: All chiller plant control and status events shall be recorded, at the operator's selection, in the building management system event log to facilitate troubleshooting.
 - e. Alarm Indications: The chiller plant control status screens shall display chiller plant and individual chiller alarm messages.
 - f. Add/Subtract Actions: The status screens shall provide information on when the next chiller add or subtract action will occur. The operator shall have the ability to manually force a chiller addition or a chiller subtraction.

C. Energy Management Applications:

1. Programs: DDC controllers shall have the ability to perform any or all of the following energy management routines:
 - a. Distributed Power Demand: Distributed power demand program shall be based on a sliding window instantaneous demand algorithm. The DDC controller interface to the demand meter shall calculate the demand, forecast the demand trend, compare it to established demand limits and initiate load shedding action or reestablishment of loads as required. Shedding shall be on a sequential basis with least important loads shed first and restored last. Restoration cycle shall add the most important loads first. DDC controllers on the bus shall each have a four-tier shed table for assignment of shedable loads. When a request is issued to the bus to shed a specific number of kilowatts each controller will shed Tier 2 loads, etc. until the shed requirement is met. The power demand control software and programming logic, shall be furnished but shall not be implemented, unless directed by Owner/Engineer.
 - 1) Demand Limiting.
 - a) The demand-limiting program shall monitor building power consumption from signals generated by a pulse generator (provided by others) mounted at the building power meter or from a watt transducer or current transformer attached to the building feeder lines.
 - b) The demand-limiting program shall predict the probable power demand such that action can be taken to prevent exceeding the demand limit. When demand prediction exceeds demand limit, action will be taken to reduce loads in a predetermined manner. When demand prediction indicates the demand limit will not be exceeded, action will be taken to restore loads in a predetermined manner.

- c) Demand reduction shall be accomplished by the following means:
 - (1) Reset air-handling unit supply temperature setpoint up by 1DC (2°F).
 - (2) Reset space temperature setpoints up by 1DC (2°F).
 - (3) De-energize equipment based upon priority.
- d) Demand-limiting parameters, frequency of calculations, time intervals, and other relevant variables shall be based on the means by which the local power company computes demand charges
- e) Provide demand-limiting prediction and control for any individual meter monitored by the system or for the total of any combination of meters.
- f) Provide the means for an operator to make the following changes online:
 - (1) Addition and deletion of loads controlled.
 - (2) Changes in demand intervals.
 - (3) Changes in demand limit for meter(s).
 - (4) Maximum shutoff time for equipment.
 - (5) Minimum shutoff time for equipment.
 - (6) Select rotational or sequential shedding and restoring.
 - (7) Shed/restore priority.
- g) Provide the following information and reports, to be available on an hourly, daily, and monthly basis:
 - (1) Total electric consumption.
 - (2) Peak demand.
 - (3) Date and time of peak demand.
 - (4) Daily peak demand.

2) AHU System Level Operation

- a) Minimum Required Outdoor Airflow Setpoint:
 - (1) The air handler Outdoor Air VAV terminal shall be controlled to deliver required outdoor airflow to each individual zone at all load conditions. The minimum outdoor airflow setpoint shall be determined using ASHRAE Standard 62-04, Equation 6.1. The actual outdoor airflow shall be sensed at VAV terminal.
 - (2) The ventilation fraction (design ventilation airflow for the zone divided by primary airflow) shall be continuously calculated for each zone. Continuously determine the maximum zone ventilation fraction (Z), the sum of the outdoor air requirements for all zones (Von) and the total supply airflow (Vst). This information shall be used in Equation 6.1 of ASHRAE Standard 62-04 to calculate the minimum required outdoor airflow (Vot). The minimum required outdoor airflow (Vot) setpoint shall be regularly recalculated based on the prevailing zone conditions.

- (3) The contractor shall submit a written sequence of operation and sample programming required to determine the minimum required outdoor airflow (Vot) setpoint.
- (4) Prior to final system acceptance, a trend log of actual air system operation over a typical forty-eight hour period shall be required by the engineer and owner. System operating conditions to be logged include: critical space ventilation fraction, system supply air flow, calculated outdoor airflow setpoint, and actual measured outdoor airflow at 30-minute intervals.

3) Discharge Duct Static Pressure Setpoint

- a) The building automation system shall continuously monitor the damper position of all VAV terminal units. The discharge duct static pressure shall be sensed directly at the discharge of each air handler. Mount sensor in a non-turbulent location.
- b) When any damper is more than 95% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset upward by 5% (adj.) of the maximum system static pressure setpoint at a frequency of 10 minutes (adj.) until no damper is more than 95% open or the static pressure setpoint has reset upward to the system maximum setting or the inlet vanes (or frequency inverter) are at their maximum setting.
- c) When all dampers are less than 85% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset downward by 5% (adj.) of the maximum system static pressure setpoint at a frequency of 10 minutes (adj.) until any damper is more than 85% open or the static pressure setpoint has reset downward to the system minimum setting or the frequency inverter are at their minimum setting.
- d) The control bands, setpoint increment values, setpoint decrement values and adjustment frequencies shall be adjusted to maintain maximum static pressure optimization with stable system control and maximum comfort control.

END OF SECTION

SECTION 26 05 01

SCOPE OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Refer to Specification Section 20 05 00 for related required Codes and Standards.
- C. Refer to Specification Section 20 05 04 for related required Schedule of Submittal Data.
- D. Requirements of Division 20 apply to all Work of Divisions 20-28.

1.2 SCOPE

- A. Work Included: The Work includes but is not limited to the following systems, equipment, and services:
 - 1. Switchboard, power distribution equipment, power distribution panels, panelboards, residential load centers, individual motor controllers, transformers, SPD systems, etc.
 - 2. A complete system of electrical conductors installed in conduit for electrical service equipment, bussed weatherhead equipment, switchboard, distribution panelboards, panelboards, general equipment, motors, refrigeration equipment, space heating equipment, lighting fixtures, wiring devices, disconnect switches, and special systems.
 - 3. Connection of all motors, equipment, interlocks, interconnections, and other components, including all motor controllers.
 - 4. Lighting fixtures, receptacles, switches, etc. Refer to the Architect for exact location of all these Devices.
 - 5. Lighting and power junction boxes including homeruns, in the unfinished areas.
 - 6. A system of empty conduits and other provisions as required for installation of the telephone system, data system, and fire alarm system shall be provided.
 - 7. If exposed low voltage wires/cables, plenum rated or otherwise, are routed above ceilings, provide conduit raceways where these wires/cables enter or transition mechanical rooms, electrical rooms, or other rooms without ceilings. Exception: telephone and data cables within dedicated MDF, IDF, or server rooms.
 - 8. Place all conduits and boxes in slabs, walls and ceilings in cooperation with other trades.
 - 9. Lightning protection system.

1.3 WORK OF OTHER DIVISIONS

A. The following is a partial list of work not included in Division 26:

1. Building Controls shall be furnished and installed under Division 25. Control power for Temperature Control equipment shall be provided by Division 26. Refer to Division 25 for additional requirements.

END OF SECTION

SECTION 26 05 07

TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. General Division 20-28 Materials and Methods - Section 20 05 05
 - 3. Schedule of Submittal Data - Section 20 05 04
 - 4. Scope of Work - Section 26 05 01

1.2 SCOPE

- A. All building electrical system additions and new equipment shall be tested and adjusted for proper operation. All faulty equipment and material shall be repaired or replaced. Specified tests requiring submittal of test results are outlined herein and in other sections.
- B. All instruments, materials, personnel, and documentation of test results shall be included in the Work of this contractor.
- C. Provide all testing of the electric system required by the Authorities Having Jurisdiction. Tests shall include but shall not be limited to the items specified herein.
- D. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Conductors - Section 26 05 19
 - 2. Grounding - Section 26 05 26
 - 3. Service Provisions - Section 26 05 44
 - 4. Dry Type Transformers – Section 26 22 13
 - 5. Switchboards - Section 26 24 13
 - 6. Circuit Breaker Distribution Panels – 26 24 16
 - 7. Circuit Breaker Lighting and Power Panelboards – 26 24 17
 - 8. Dual Purpose Docking Stations – 26 25 50
 - 9. Elevator Distribution Equipment – 26 27 29
 - 10. Safety and Disconnect Switches – 26 28 16 16
 - 11. Individual Motor Controllers – 26 29 13

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Submittals shall include, but not be limited to, the following:
1. Four (4) copies of certified test results for each test indicated herein, for approval and future references.
 2. Certifications as required herein.
 3. Additional information as required in Section 20 05 03.

3.2 CONDUCTOR TESTS (600 VOLTS OR LESS)

- A. Prior to energizing of all new feeders, test all conductors for continuity of circuitry and for short circuits. No submittal is required for this test. Each wiring system with devices connected must test free from short circuits and grounds.
- B. Each new feeder conductor shall have its insulation resistance tested after its installation is completed except for connection at its source and point of termination.
- C. Test shall be made using a Biddle Megger or equivalent at a voltage of not less than 1000 VDC, and after one minute of operation at slip speed. Resistance shall be measured by connecting one terminal of megger to conductor and other terminal to conduit in which conductor is installed. Reading shall be observed after 15 seconds of operation of the megger.
- D. Conductors which do not meet or exceed the following insulation resistance values shall be removed, replaced, and retested.

WIRE SIZE (AWG)	INSULATION RESISTANCE (OHMS)
NO. 12	1,000 K
NO. 10 THROUGH NO. 8	250 K
NO. 6 THROUGH NO. 2	100 K
NO. 1 THROUGH NO. 4/0	50 K
LARGER THAN NO. 4/0	25 K

- E. Conductor test results shall indicate weather conditions, temperature, relative humidity, date and time, feeder tested, conductor size and type and resistance measurements.

3.3 SERVICE SWITCHBOARD GROUND RESISTANCE TEST

- A. Perform a ground resistance test on the switchboard grounding system for comparison of future inspection and testing data by the Owner. Overall system resistance shall not exceed 10 ohms. Eliminate any stray currents, shorts, or non-consistencies in the grounds system.
- B. The test shall be performed using a Biddle Megger Earth Tester or equivalent test instrument and shall not be performed during the 48 hours immediately following wet weather conditions.
- C. Switchboard ground resistance test results shall indicate weather conditions for test, grounding system tested, grounding configuration and test results.

3.4 GROUND FAULT PROTECTION SYSTEM TESTS

- A. Factory test: The switchboard ground fault protection system shall be factory tested prior to shipment. The switchboard manufacturer shall provide factory ground fault interlocking and protection system test for circuit testing, and verification of interlocking and tripping characteristics. The manufacturer shall pass predetermined values of current through the relay sensors, and measure the relay tripping time for each phase, and neutral. The measured time/current relationships shall be compared to the relay trip characteristics curves. If the relay trips outside the range of values indicated on the curve, the relay shall be replaced. This test shall include verification of polarity of the ground sensor circuits' interconnection.
- B. Certified "factory test" results shall indicate relay number, device served, actual characteristic curves, design characteristic curves and overall test results.
- C. Field test: Following completion of the construction and prior to final acceptance testing, the ground fault protection system shall be field tested and reset to the manufacturer's recommended setting for both time and current, by a representative of the Manufacturer's Engineering Service Department. The field test shall be conducted in a similar manner to the factory test in that a cable from a low voltage, high-current test set shall be passed through each current sensor. This test shall also demonstrate the complete system reliability in that it must operate the associated shunt trips and show that the overcurrent devices which they operate will actually open.
- D. Certified "field test" results shall indicate relay tested, relay settings, and test results.

3.5 ARC ENERGY REDUCING SYSTEM TESTS

- A. Factory test: For equipment requiring Arc Energy Reduction per NEC or per this specification, The Arc Energy Reducing(AER) system shall be factory tested prior to shipment. The manufacturer shall provide factory interlocking and system testing with verification of performance.
- B. Certified "factory test" results shall indicate panel, device served, settings, actual characteristic curves with and without AER system engaged, and overall test results.

- C. Field test: Following completion of the construction and prior to final acceptance testing, the AER system shall be field tested by a representative of the Manufacturer's Engineering Service Department. The field test shall be conducted in a similar manner to the factory test. This test shall also demonstrate the complete system reliability.
- D. Certified "field test" results shall indicate AER system tested, panel name, device served, settings, and test results.

3.6 DRY-TYPE TRANSFORMER - LOAD, VOLTAGE AND TAP SETTING

- A. Measure and record load current and voltage on each dry-type transformer, while loaded, to verify proper tap setting. Include tap selection with submittal data.
- B. Transformer test results shall show transformer tested, load current (secondary), input and output voltage, neutral/ground bond verification, and tap setting.

3.7 BALANCING OF ELECTRICAL CIRCUITS

- A. The system of feeder and branch circuits for power and lighting shall be connected to panelboard buses in such a manner that loads connected thereto will be balanced on all phases as close a practicable.
- B. Should there be any unfavorable condition of imbalance on any part of the electrical system phase to phase measured on average over 5 business days, the electrical contractor shall make such changes that may be necessary to remedy the imbalanced condition.
- C. Prior to completion of the project, provide a complete list of all panels stating the measured loads on each phase. Test results shall indicate panels tested, amperage per phase, and any remedial action taken.

3.8 OPERATIONAL TESTING

- A. Take voltage and currents readings for each feeder and motor circuit under maximum operating conditions. Questionable readings shall be repeated at no cost for confirmation.
- B. Controls for lighting and receptacle circuits shall be demonstrated.
- C. Demonstrate running of motors with controls and interlocks.
- D. Demonstrate operation of electrical equipment appliances.

3.9 THERMOGRAPHIC TESTS

- A. Contractor shall provide a thermographic test using an independent testing laboratory. Testing shall apply to, but not be limited to, the following:
 - 1. Switchboards
 - 2. Distribution Panelboards
 - 3. Panelboards
 - 4. Other electrical distribution devices

- B. After the entire electrical system has been checked and adjusted and is under load but just prior to project completion, equipment and connections shall be subjected to a thermographic test using an infrared temperature scanning unit. Any connections found to have higher temperature than acceptable shall be corrected as required and re-tested.

END OF SECTION

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SECTION 26 05 19

CONDUCTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07

1.2 SCOPE

- A. Furnish and install conductors for all new circuits as shown, scheduled, specified, and required. All conductors for power and lighting shall be installed in conduit.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Testing - Section 26 05 07
 - 2. Conduit - Section 26 05 33

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Wire and Cable:
 - a. Southwire
 - b. Cerro
 - c. Encore Wire Corporation
 - d. Service Wire
 - 2. Cable Lugs and Termination Fittings:
 - a. T&B
 - b. Burndy
 - c. Ideal
 - d. IlSCO
 - e. Penn Union
 - f. Thomas & Betts

3. Pre-Insulated Spring Type Connectors:

- a. Buchanan
- b. Ideal
- c. 3-M Scotchlock
- d. GB

- B. Codes and Standards: All conductors furnished and installed shall comply with the requirements and latest revisions of the National Electrical Code (NEC), National Electrical Safety Code (NESC), and Standards of the Underwriter's Laboratories (UL), National Electrical Manufacturer's Association (NEMA), Institute of Electrical and Electronic Engineers (IEEE).

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. General:

- 1. All feeder and branch circuit conductors shall be soft drawn, annealed copper, having a conductivity of not less than 98% of that of pure copper, and meeting before stranding, the requirements of ASTM B-3, "Standard Specifications for Soft or Annealed Copper Wire for Electrical Purposes", latest edition.
- 2. Aluminum conductors with type XHHW-2 insulation and AA-8000 series aluminum alloy, compact stranded configuration will be acceptable for conductors larger than #1 AWG where specifically indicated on Drawings.

B. Insulation:

- 1. No. 10 and Smaller: Unless otherwise specified or noted, all conductors No. 10 and smaller shall be solid copper THHN or THWN-2 with an insulating outer jacket suitable for conductor temperatures of 75°C wet or 90°C dry, except for NEC Class 1, 2, or 3 conductors which may be stranded if terminated as required herein.
- 2. No. 8 and Larger: Unless otherwise specified or noted, all conductors No. 8 and larger shall be THWN-2/THHN, 600 volts, stranded, with a thermoplastic insulating compound and an outer jacket suitable for conductor temperatures of 75°C wet or 90°C dry, inclusive. Stranded wire shall be terminated as specified herein.
- 3. High Temperature Areas: In the ceiling areas of equipment rooms where the temperature may exceed 102°F under operating conditions, higher temperature insulation shall be used on conductors. Acceptable types are RHH, THHN, and XHHW.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittals shall include, but not be limited to, the following:
 - 1. The Contractor shall submit to the Engineer for review, a list of the proposed manufacturers of conductors, cable lugs, cable connectors, and termination fittings listed herein. The Contractor may install wire, cable, cable lugs, cable connectors and termination fittings furnished by any manufacturer listed on the approved submittal.
 - 2. Cut sheets on all 600-volt conductors with manufacturers name, ratings and capacities, insulation characteristics, and available colors, clearly listed.
 - 3. Cut sheets indicating all cable lugs, termination fittings and cable connectors.
 - 4. Cut sheets indicating types of conductor identification bands.
 - 5. Additional information as required in Section 20 05 03.

3.2 INSTALLATION

- A. Mains and feeders are to be run their entire length in continuous pieces without joints or splices, unless otherwise indicated.
- B. Conductors may be run in multiple sizes 1/0 through 750 MCM inclusive, provided all multiple conductors are the same size, length, and type of insulation, and they shall be so arranged and terminated as to insure equal division of the total current between all conductors involved.
- C. All underground feeders shall be type THWN-2.
- D. Home Runs: Except where specifically indicated, provide branch circuit home runs with not more than two different line conductors and a common neutral in a single raceway for 3-wire, single-phase systems, no more than three different line conductors and a common neutral in a single raceway for 4-wire, 3-phase systems. For all ground fault circuits, provide a separate neutral conductor for each GFI breaker. A maximum of nine (9) current carrying conductors are allowed in a single conduit. NEC conduit fill ratio shall not be exceeded. Use home run circuit numbers as indicated for panelboard connections.
- E. For 20 ampere branch circuits operating at 150 volts or less line to neutral, utilize No. 10 AWG wire minimum for the entire branch circuit when the last outlet is in excess of 75 feet of cable length from the panelboard.
- F. For 20 ampere branch circuits operating at 150 volts or less line to neutral, utilize No. 8 AWG wire minimum for the entire branch circuit when the last outlet is in excess of 150 feet of cable length from the panelboard. This minimum requirement applies to general purpose outlets. This requirement shall not apply to dedicated circuits with load less than 10 amps.
- G. For 20 ampere branch circuits operating at 151 to 300 volts line to neutral, utilize No. 10 AWG wire minimum for the entire branch circuit when the last outlet is in excess of 150 feet of cable length from the panelboard.

- H. For 20 ampere branch circuits operating at 151 to 300 volts line to neutral, utilize No. 8 AWG wire minimum for the entire branch circuit when the last outlet is in excess of 300 feet of cable length from the panelboard. This minimum requirement shall not apply to any circuits with load less than 10 amps.
- I. No conductor smaller than No. 12 AWG copper shall be used for power or lighting purposes, including switch legs.
- J. Control circuit conductors may be No. 14 AWG and may be run in the same conduit with power wiring, subject to compliance with control system performance requirements and NEC conductor insulation requirements. No conductor smaller than No. 18 AWG shall be used for control circuits.
- K. Conductors for connection to individual light fixtures in grid type ceilings, using 72-inch-long (max.) by 3/8 inch (minimum) flexible metal conduit fixture-tails, from their associated junction boxes, shall be #14 AWG THHN, 600 volts, solid, with a thermoplastic insulating compound and an outer jacket suitable for conductor temperature of 90°C. MC cable will also be acceptable for this application. Reference conduit section for MC cable requirements.
- L. All conductors in vertical conduits or raceways shall be supported in the manner set forth in the latest edition of the National Electric Code.
- M. Lighting fixtures shall not be used for raceways for circuits other than parallel wiring of fixtures.
- N. On communication and signal systems, minimum conductor size shall be 18 gauge. Multi-conductor PVC insulated, and jacketed cables shall be used unless otherwise noted.
- O. Before any conductor is pulled into any conduit, the conduit shall be thoroughly swabbed in such a manner as to remove all foreign material and to permit the wire itself to be pulled into a clean, dry conduit.
- P. Powdered soapstone, Ideal Yellow 77, or Polywater may be used as a lubricant where necessary.
- Q. Wire pulling lubricant shall not be used when installing branch circuit conductors from panelboards with "isolation" transformers.
- R. All conductors shall be new, unused, in good condition, and shall be delivered in standard coils, packaged, or rolls. Samples of all conductors shall be submitted by the Contractor when requested by the Engineer for the purpose of determining acceptability.
- S. Wire which has been rejected by the Engineer shall not be used again. Decisions as to the quality of the wire furnished, and the acceptance of such wire shall be made by the Owner's duly authorized representative.

3.3 IDENTIFICATION OF 600 VOLT CONDUCTORS

- A. Reference Division 20 for requirements.

3.4 COLOR CODING OF 600 VOLT CONDUCTORS

- A. The color of the insulation of the conductors shall be selected to conform in all instances to the following table. However, if colored insulation is not available, three bands of adhesive-backed colored tape corresponding to the color required by the following table shall be wrapped at every termination or tap of the conductor.

COLOR PHASE TABLE FOR INSULATED WIRE			
PHASE	120V/208V SYSTEM COLOR OF WIRE	120V/240V SYSTEM COLOR OF WIRE	480V/277V SYSTEM COLOR OF WIRE
A	BLACK	BLACK	BROWN
B	RED	ORANGE	PURPLE
C	BLUE	BLUE	YELLOW
NEUTRAL	WHITE	WHITE	GRAY
GROUND	GREEN	GREEN	GREEN

- B. Gray and white colors shall be used only as specified above. All control conductors shall be distinctively color coded, and where run in the same conduit as power conductors, shall be of different colors to the power conductors.

3.5 SPLICES, TAPS, AND TERMINATIONS FOR 600 VOLT CONDUCTORS

- A. Splices and taps on branch circuits shall occur only when such circuits divide and shall consist of one "through" circuit to which the remaining circuit shall be spliced or tapped.
- B. No splices or taps shall be made in any conductor except in outlet boxes, junction boxes, splice boxes, or other devices and equipment in exposed and accessible locations approved for the purpose by the latest edition of the NEC.
- C. All No. 10 AWG and smaller solid conductors shall be spliced with pre-insulated spring connectors. All No. 10 AWG and smaller stranded conductors for NEC Class 1, 2, 3 wiring shall be terminated with AMP "PIDG" UL, listed premium grade insulated fork connectors, or approved equal, and shall be spliced in a junction box with AMP "Plastic-Grip" UL listed standard grade insulated butt splices, or approved equal.
- D. All No. 8 AWG and larger copper conductors shall be connected with high conductivity, wrought copper, color-keyed compression connectors. Compression connectors for all feeders shall be Thomas & Betts Series 54200, or equal, two-hole connectors. Where equipment or devices cannot be provided by the manufacturer to accept two-hole connectors, T & B Series 54100, or approved equal, single-hole connectors with anti-rotation lug or restraint shall be used. Where equipment or devices cannot be provided by the manufacturer to accept either two-hole or single-hole compression connectors, set-screw type connectors may be used.

- E. All No. 8 AWG and larger copper conductors which are to be spliced or tapped in wireways, gutters, or junction boxes shall be sliced or tapped using hydraulically applied, high conductivity compression connector, T & B 54700 or approved equal, compression taps, and 3-M electrical tape or manufactured connector covers approved for the purpose.
- F. The manufacturer's recommended installing tool shall be used for the installation of all hydraulically applied compression type lugs or connectors. Modifications of connectors are not acceptable.
- G. All bolt and screw connections shall be torqued in accordance with the manufacturer's recommendations. Submittals shall include these recommendations.
- H. Where conductor splices or reducers are specifically noted on the drawings or where specifically approved by the engineer, Polaris #ISR series insulated splicer/reducers shall be used. Contractor shall provide a junction box of suitable size for the splice and associated conductors. Splices shall not be made in equipment enclosures.

3.6 FIELD TESTING

- A. Refer to Section 26 05 07 for field testing of 600-volt wire and cable.

END OF SECTION

SECTION 26 05 23

MOTOR AND CONTROL WIRING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements – Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing – Section 26 05 07

1.2 SCOPE

- A. General: Furnish and install all equipment power connections and control wiring as shown, specified, and required.
- B. Types: The types of motor power connections and control wiring include, but are not limited to, the following:
 - 1. Motor and Equipment Power Connections
 - 2. Miscellaneous Control Power and Control Wiring
 - 3. HVAC Temperature Control Wiring
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Owner and Contractor Furnished Equipment - Section 20 05 06
 - 2. Conductors - Section 26 05 19
 - 3. Conduit - Section 26 05 33
 - 4. Individual Motor Controllers - Section 26 29 13

PART 2 - PRODUCTS

2.1 MOTOR AND EQUIPMENT POWER CONNECTIONS

- A. All power connections to motors, and equipment furnished by other Divisions shall be made by this Division, unless noted otherwise on the Drawings. This Division shall provide and install all power wiring and shall make all final connections.

- B. Refer to the Drawings, approved Shop Drawings, Divisions 20-28 and other applicable Divisions for required power connections to equipment and motors.
- C. In general, motorized or electrically operated equipment with integrally mounted starters, controls and disconnect switches will be set in place by the furnishing Division. The furnishing Division will furnish for installation and connection by this Division all starters, controllers and disconnect switches, which are furnished with their equipment, but not integrally mounted.
- D. This Division shall furnish, install and connect all required overcurrent protection devices, starters and disconnect switches, which are not provided with the served equipment. Where disconnect switches are not provided with served equipment and are required by the NEC or the local inspection department, then they shall be provided under this Division.
- E. This division shall furnish and install all interconnecting power wiring and make all connections ready for operation between overcurrent protection devices, motors, starters and control devices, as required by wiring diagrams from approved Shop Drawings provided by the Division furnishing the Equipment.

2.2 MISCELLANEOUS CONTROL POWER AND CONTROL WIRING

- A. This Division shall furnish miscellaneous 120 Volt control power circuits and control wiring as required for systems and equipment furnished by this and other Divisions. This control power and control wiring shall be furnished by this Division for all systems and equipment and where shown on the Drawings or approved Shop Drawings by the Division furnishing the system or equipment.
- B. In general, all starters and controllers for non-120 Volt equipment and motors shall be furnished with control power transformers, and control power circuits will not be required. Where control power transformers are not furnished, then 120 Volt control power circuits shall be furnished by this Division.
- C. Systems and devices requiring control power circuits and control wiring shall include, but not be limited to:
 - 1. Automatic temperature control air compressors (where applicable).
 - 2. Automatic temperature control BCAS panels.
 - 3. Domestic water pump, surge tank alarm, and domestic water system controls.
 - 4. Fire pump controls and alarms, including wiring to remote panels.
 - 5. Sprinkler alarms.
 - 6. Emergency generator and automatic transfer switch controls, battery charger, and jacket water heaters.
 - 7. Landscape sprinkler systems.
 - 8. Elevator and escalator controls.
 - 9. Lighting and power control contactors and relays.
 - 10. Start/stop stations where required for remote motor controllers.
 - 11. Interlock control wiring.
 - 12. Contractor furnished equipment controls.
 - 13. Owner furnished equipment controls.
 - 14. Sewage ejector and sump pump controls and alarms.

15. Water chilling unit control wiring for units with remote starters.
16. Refrigerant monitoring controls.
17. Cooling tower vibration switches.
18. Water treatment systems.
19. Fire alarm system.
20. Fireman's HVAC override system.
21. Smoke dampers.
22. Remote annunciators, alarm panels, alarms and signaling devices/systems.
23. Power circuits to security device locations.
24. Fuel oil system controls, monitoring, and alarms.
25. Additional control power, control wiring, and safety devices as shown, specified, or required.

2.3 HVAC CONTROL WIRING

- A. HVAC temperature control wiring is specified and provided under Division 25. The only HVAC temperature control wiring and work included in the Work of this Division is providing 120 Volt control power circuits for temperature controls and coordination of Fire Alarm and smoke control feature connections to the temperature control system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Motor and Equipment Power Connections: Furnish and install all interconnecting power wiring and make all connections between overcurrent protection devices, motors, starters, and control devices.
- B. Miscellaneous Control Power and Control Wiring:
 1. In general, miscellaneous control power circuits shall be obtained from spare breakers in building normal power panels. Where emergency system control power is required, or control power requirements are large or significantly greater than normal, notify the Architect/Engineer in writing of the requirements.
 2. All control devices, which are part of smoke control features, the Life Safety System, and equipment and devices served with emergency power shall have their control power circuits derived from an emergency source.
- C. Control wiring shown on the drawings or specified in other Division 20-28 sections is not an inclusive listing of all control wiring required on the project. All required control wiring, unless noted otherwise herein, shall be furnished and installed by the Division 26 Contractor.

END OF SECTION

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SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07

1.2 SCOPE

- A. General: Furnish and install ground equipment as specified, shown, and required.
- B. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Lightning Protection Systems - Section 26 41 13

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Burndy
 - 2. Copperweld
 - 3. Cooper
 - 4. Erico
 - 5. ThermOweld
- B. Codes and Standards:
 - 1. National Electrical Code (NEC), Article 250.
 - 2. UL 467

PART 2 - PRODUCTS

2.1 GROUNDING SYSTEM MATERIALS

- A. Ground Clamps: Connections of connecting grounding conductors to copper, brass, or lead pipes should be made with ground clamps made of copper and if pipes are of steel or iron, the ground clamps should be made of galvanized iron. These clamps shall be designed to provide permanent and positive pressure and to avoid mechanical injury to the pipe.
- B. Grounding Conductors and Jumpers: Grounding conductors and jumpers shall be connected to each other and to items to be grounded by means of approved type compression connectors, approved by the Owner's duly authorized representative. No solder connections shall be made.
- C. All concrete encased or direct buried underground grounding electrode conductors shall be of bare copper, Class B, stranded.
- D. Bonding conductors shall be bare copper, sized as indicated or larger if required by code.
- E. Grounding Rods: Grounding rods shall be a minimum of 3/4 inch diameter by 10 feet long, copper clad steel with high-strength steel core and electrolytic-grade copper outer sheath, molten welded to the core.
- F. Fusion Welds: Connections to grounding rods, building steel, reinforcing steel, inaccessible locations, and downleads shall be made with a U.L. approved exothermic fusion weld similar to ThermOweld, or engineer approved equal. All welds are to be done with a clean mold to prevent "blowout" of the weld metal.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittals shall include, but not be limited to, the following:
 - 1. Cut sheets of grounding electrodes, clamps, connectors, and accessories.
 - 2. Additional information as required in Section 20 05 03.

3.2 INSTALLATION

- A. General: The electrical distribution system shall be grounded in accordance with Article 250 of the National Electrical Code (NEC), as shown and specified, and recognized industry practices to ensure that products serve the intended functions.
- B. Grounding Electrode System:
 - 1. The grounding electrode system shall be as specified herein. A ground conductor shall be bonded together with the grounding electrodes, the incoming cold-water metallic piping system to the building, the building metal frame, the

- concrete encased metal frame of the building, and the concrete encased steel reinforcing bars in the building footings. This bonding shall serve as the grounding electrode system in accordance with the requirements of the Code.
2. The grounding electrode conductor from the point of connection at the grounding electrode system to the system neutral in the service entrance equipment shall be insulated stranded copper installed in a separate conduit and shall be without joints or splices over its entire length.
 3. Bonding Conductors: Splices shall be made only where connections are made to the ground ring.
 4. Ground Ring: A bare copper conductor encircling the structure shall be installed in direct contact with the earth at a depth below earth surface not less than 2'-6". Size shall be minimum #3/0 or as indicated on the Drawings. The loop thus formed shall be bonded together with the Grounding Electrode System.
- C. Building Equipment Grounding System: The building equipment grounding system shall consist of the equipment ground wire, and electrically continuous metallic conduit system as shown. Every item of equipment served by the electrical system shall be bonded to the building equipment grounding system. All conduit systems, cabinets, junction boxes, motor frames, equipment skids, electrically operated and/or controlled cooling-heating units, luminaires, miscellaneous equipment, etc., shall be grounded with an equipment ground conductor. Portions of metallic piping and duct systems that are electrically isolated shall be bonded to the equipment grounding system with a flexible bonding jumper.
- D. System Neutral: The system neutral shall be grounded to the grounding electrode system at the service entrance only and shall be kept isolated from the building. Separately derived systems shall be grounded at one point as specified herein below.
- E. Miscellaneous: Provide bonding and grounding wires run in conduit and sized per the NEC and in accordance with the local electrical inspection department. Metallic piping and duct systems which enter the building shall be bonded at the point of entry to the building, in accordance with the NEC.
- F. Continuity: Continuity of the building equipment grounding system shall be maintained throughout the project. Grounding jumpers shall be installed across conduit expansion fittings, all liquid-tight flexible metal conduit, light fixture pigtails in excess of 6 feet, and all other non-electrically continuous raceway fittings. Any point of poor or incomplete continuity of a raceway system being used as a ground conductor shall have a jumper connected across this point.
- G. Special Grounding: Provide special grounding systems where shown.
- H. Separately Derived System Grounding: Bond the case and neutral of each transformer directly to the nearest available effectively-grounded structural metal member of the structure and water piping. Provide a transformer grounding distribution system in accordance with NEC separately derived system grounding requirements. Flexible conduit shall not be used as a ground path to a transformer. Generators shall be separately derived where indicated on Drawings.

- I. Telephone Equipment Grounding: Provide a ground conductor from the telephone service equipment to the building grounding system as required by the local Telephone Company.
- J. Lighting Fixtures: Carefully and securely ground all lighting fixture bodies to the conduit grounding system. Flexible conduit longer than 6 feet shall not be considered a ground path.
- K. Receptacles: Ground all grounding-type receptacles with ground clips, properly installed using a separate ground wire.
- L. Motor Frames: Ground the frame of each motor with a properly sized separate ground wire around the flexible conduit.
- M. Lightning Protection System: Lightning protection system ground terminals shall be bonded to the building grounding electrode system per NEC.

3.3 TESTING

- A. Ground Resistance Test: Refer to Section 26 05 07 for test requirements.

END OF SECTION

SECTION 26 05 33

CONDUIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07

1.2 SCOPE

- A. General: Furnish and install conduit and raceways as shown, scheduled, specified, and required.
- B. Types: The types of conduit and raceways include, but are not limited to, the following:
 - 1. Rigid Steel Conduit
 - 2. PVC Coated Rigid Steel Conduit (Plastibond)
 - 3. Electrical Metallic Tubing (EMT)
 - 4. Aluminum EMT and Rigid
 - 5. Flexible Metal Conduit
 - 6. Liquid-Tight Flexible Metal Conduit
 - 7. High Density Polyethylene (HDPE)
 - 8. Type "MC" Metal Clad Cable
 - 9. Type "MI" Cable (2-Hour Fire Resistive)
 - 10. Type "HCF" Armored Cable
 - 11. PVC Conduit
 - 12. Surface Metal Raceway
 - 13. Underfloor Metal Raceway
- C. Related Sections: Other Division 20-28 Sections contain requirements related to the work of this Section. These may include, but not be limited to, the following sections:
 - 1. Conductors - Section 26 05 19

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Conduit, raceways, hangers, supports, and their installations shall comply with all requirements of the National Electrical Code (NEC).

PART 2 - PRODUCTS

2.1 METAL CONDUIT

- A. Furnish and install metal conduit as specified herein and as indicated on the drawings.
- B. All electrical conductors shall be installed in conduit, or surface metal raceways. Conduit shall be as specified herein. In addition, empty conduit or surface metal raceways shall be installed for the telephone system, and for other systems as indicated on the Drawings and in the Specifications.
- C. For the purpose of this Specification, the term "metal conduit" shall be defined as rigid steel conduit and steel electrical metallic tubing.
- D. Rigid Steel Conduit:
 - 1. Rigid steel conduit shall be used where conduit is underground, in a concrete slab with a vapor barrier, exposed to the weather, in damp or other wet locations, where exposed to view, where subject to physical damage, or in sizes greater than 4" in diameter. Use locator tape 12" above conduits for all underground conduit outside slab area.
 - 2. All exterior conduit shall be rigid galvanized. Locknuts for exterior applications shall be sealing type.
 - 3. Conduit shall be joined with threaded couplings and shall be secured in cabinets, outlets, etc., with double locknuts and shall be provided with insulated bushings as manufactured by Crouse-Hines (Midwest), Steel City (Thomas & Betts), Raco, OZ - Gedney, Appleton, Bridgeport Fittings, Myers Electrical Products, Picoma Industries, etc., shall be threaded.
 - 4. All conduit and fittings shall in all respects, meet the requirements of the latest edition of Underwriters' Laboratories Standards for Rigid Metallic Conduit.
 - 5. Rigid steel conduit shall be hot-dipped galvanized in accordance with the National Electrical Code - Article 344, inside and out. Full lengths of pipe with threads on both ends or uncoupled shall have galvanized or zinc-coated produced to ANSI Specifications C-80.1 and Federal Specifications WW-C-581E and shall carry the Underwriters Laboratories Label.
 - 6. Rigid steel conduit shall be Allied Tube and Conduit, Wheatland Tube, and Western Tube and Conduit, or approved equal.
 - 7. Pulling Elbows are to be malleable iron only. Die cast aluminum is not acceptable. Where conduit is required to have epoxy coating, pulling elbows are to be "Plasti-Bond" coated or equal to match.
- E. PVC Coated Rigid Steel Conduit
 - 1. All rigid steel conduit and fittings exposed to extreme humidity such as adjacent to cooling towers shall be Rob Roy "Plasti-Bond", Occidental Coating Co., Perma-Cote Industries, or approved equal.
- F. Electrical Metallic Tubing (EMT):

1. EMT may be used indoors where concealed or exposed above grade, except where rigid steel conduit is required. Electrical metallic tubing shall be made of thin-wall steel tubing up to 4" conduit size, and shall be galvanized inside and outside.
2. EMT shall be joined with steel set screw type couplings and conduits shall be secured with steel set screw type connectors at panels, junction boxes, outlets, etc. EMT, which is cast in concrete, shall be joined using concrete-tight compression fittings. Die-cast type connectors are not acceptable.
3. EMT and fittings shall, in all respects, meet the requirements of the latest edition of the National Electrical Code - Article 358, and Underwriters' Laboratories Standards for Electrical Metallic Tubing.
4. Provide insulating bushings at terminations, and on the open end of conduits not terminated in panels, junction boxes, outlets, etc. Provide insulated throats for sizes 3/4" and 1", and provide nylon bushings for sizes 1-1/4" and larger conduits.
5. If it complies with these Specifications, conduit manufactured by one of the following manufacturers will be acceptable: LTV Steel, Allied Tube and Conduit, Wheatland Tube, and Western Tube and Conduit, or approved equal.
6. If it complies with these Specifications, connectors manufactured by one of the following will be acceptable: Crouse-Hines (Midwest), Steel City (Thomas & Betts), Raco, OZ - Gedney, Appleton, Bridgeport Fittings, Picoma Industries, etc., or approved equal.

2.2 ALUMINUM CONDUIT

- A. Aluminum rigid conduit shall be manufactured of 6063 alloy in temper designation T-1. Fittings shall be of same alloy. Conduit shall be listed under UL 6 "Standard for Rigid Metal Conduit," shall be manufactured to ANSI C80.5, and shall in all respects meet the requirements of the latest edition of the National Electrical Code - Article 344.
- B. Aluminum EMT shall be manufactured of 6005 alloy. Fittings shall be of same alloy. EMT and elbows shall be listed under UL/ANSI 797, "Standard for Electrical Metallic Tubing", and shall in all respects, meet the requirements of the latest edition of the National Electrical Code - Article 358. Aluminum set screw couplings shall be listed under UL 514B "Standard for Fittings for Cable and Conduit."
- C. Conduit shall be joined and secured as described in Subsection 2.01; however, all materials must be aluminum or UL approved for the application. Provide insulated bushings and throats for EMT as described in Subsection 2.01.
- D. Aluminum conduit and fittings shall be manufactured by Sapa Extrusions, or approved equal.
- E. All rigid aluminum conduit and fittings exposed to weather shall be PVC coated conduit by Sapa Extrusions or approved equal.

2.3 FLEXIBLE METAL CONDUIT

- A. Furnish and install flexible metal conduit as specified herein and as shown on the drawings.

- B. Flexible metal conduit shall be hot-dipped galvanized steel strip, spirally wound and interlocked, and shall be provided with insulated anti-short bushings at all terminations.
- C. Flexible Metal Conduit shall be secured with galvanized or sherardized connectors with insulating bushings suitable for connection to the associated boxes and conduits. Die cast connectors are not acceptable.
- D. Flexible Metal Conduit may be used indoors at any height, in lengths not to exceed 48 inches, to extend conduit connections to motors, transformers, busway switches, air distribution terminal units, control equipment and devices, permanently connected equipment or appliances, or for equipment and devices requiring adjustment and/or removal for maintenance. Flexible metal conduit shall not be used for Utility Connections and in Elevator Machine Rooms. A "green" insulated copper grounding conductor shall be installed with the circuit conductors and sized in accordance with Table 250-122 of the latest edition of the National Electrical Code. Refer to the CONDUCTORS section for wiring and color coding requirements.
- E. Flexible Metal Conduit (minimum 3/8" diameter) may be used for fixture-tails, for connection of individual lighting fixtures to their associated lighting system junction boxes in lengths not to exceed 6 feet, and provided the circuit conductors contained therein are protected by overcurrent devices rated at 20 amperes or less. A "green" insulated copper grounding conductor shall be installed with the circuit conductors and sized in accordance with Table 250-122 of the latest edition of the National Electrical Code. Refer to the CONDUCTORS section for wiring and color-coding requirements. Verify maximum length with the City Electrical Inspection Department. MC Cable is also acceptable for this application.
- F. Continuity of the equipment ground across flexible metal conduit connections shall be maintained for all systems that are over 150 volts to ground. The continuity shall be maintained by installing a bare copper bonding conductor sized in accordance with Table 250-122 of the latest edition of the National Electrical Code. The bare copper bonding conductor shall be installed outside the flexible conduit and shall be connected on one end of the flexible conduit by a suitable binding post and similarly connected on the opposite end with another suitable binding post.
- G. If it complies with these Specifications, flexible metal conduit manufactured by one of the following will be acceptable: American Flexible Conduit Company, Anamet, Alfex or Electriflex.
- H. If it complies with these Specifications, connectors manufactured by one of the following will be acceptable: Crouse Hines (Midwest), Appleton, or Steel City (Thomas & Betts), Racor, OZ - Gedney, Appleton, Bridgeport Fittings, etc., or approved equal.
- I. Flexible Metal conduit shall not be used for Patient Care Areas in Healthcare Facilities except where specifically permitted by NEC Article 517.

2.4 LIQUID-TIGHT FLEXIBLE METAL CONDUIT

- A. Furnish and install liquid-tight flexible metal conduit as specified herein and as shown on the drawings.

- B. When equipment or motor connections are exposed to the weather or other wet locations and for Utility Connections and in Elevator Machine Rooms, liquid-tight flexible metal conduit with PVC jacket and water-tight insulated throat fittings shall be used, in lengths not to exceed 48".
- C. Liquid-tight flexible metal conduit may also be used in lengths not to exceed 48 inches, to extend conduit connections to motors, transformers, control equipment and devices, permanently connected equipment or appliances, or for equipment and devices requiring adjustment and/or removal for maintenance that are exposed to the weather or other wet locations (i.e., kitchens or associated areas).
- D. Liquid-tight flexible metal conduit shall be complete with a "green" insulated copper grounding conductor installed inside the conduit with the phase conductors. Refer to Section 26 05 19 for conductor and conductor color coding requirements.
- E. If it complies with these Specifications, liquid-tight flexible metal conduit manufactured by one of the following will be acceptable: American Flexible Conduit Company "American Tite", Electric-flex "Liquatite".
- F. If it complies with these specifications, fittings for liquid-tight flexible metal conduit manufactured by one of the following will be acceptable: Crouse-Hines (Midwest), Steel City (Thomas & Betts), Raco, OZ - Gedney, Appleton, Bridgeport Fittings, etc., or approved equal.
- G. Shall not be used for Patient Care Areas in Healthcare Facilities except where specifically permitted by NEC Article 517.

2.5 TYPE "MC" METAL CLAD CABLE

- A. Metal clad cable "MC" is only acceptable for connection of lighting fixture whips no greater than 6' in length. In such instances, MC cable shall have #12 through #8 "THHN OR XHHN" solid copper insulated phase conductors with an equipment grounding conductor as required for said terminations
- B. Metal clad cable shall be provided with insulated anti-short bushings at all terminations. Metal clad cable connectors shall be steel galvanized, suitable for connection to associated boxes. Die cast connectors are not acceptable.
- C. Type "MC" Cable shall have a full color-coding system which will allow for identification of assembly voltage. Voltage assembly for 120/208 and 277/480 shall have color-coded conductor/s to provide full phase identification for application requirements.
- D. Type "MC" Cable shall be high strength, lightweight steel with a high degree of EMI shielding. Aluminum wound sheath is not acceptable.
- E. If it complies with the specifications, Metal clad cable manufactured by one of the following will be acceptable: American Flexible Conduit, General Cable, Alfex.
- F. If it complies with the specifications, connectors manufactured by one of the following will be acceptable: Crouse-Hines (Midwest), Steel City (Thomas & Betts), Raco, OZ - Gedney, Appleton, Bridgeport Fittings, etc., or approved equal.

- G. Metal Clad Cable shall not be used in laboratory paces, hazardous locations, or exposed work. Metal Clad cable shall be permitted for individual drops to receptacles and switches in offices, classrooms, café, and conference rooms. MC Cable shall not be used for runs between junction boxes and shall not be run horizontally in partitions.

2.6 PVC CONDUIT

- A. Furnish and install PVC conduit as specified herein and as shown on the drawings.
- B. PVC conduit may be used for underground raceways except where specifically indicated or specified to be galvanized rigid steel conduit. Use locator tape 12" above conduits for all underground conduit outside slab area.
- C. PVC conduit shall not be used above the ground floor slab in the building unless it is encased in a minimum of 3 inches of concrete.
- D. An insulated ground wire sized per Article 250 of the NEC shall be included in each PVC conduit. It shall be the Contractor's responsibility to verify and provide the proper size of conduit for the feeder with the added ground wire.
- E. PVC conduit shall consist of 90°C, UL listed, Schedule 40, high impact virgin polyvinyl chloride. PVC conduit used for primary and secondary service feeders and distribution feeders shall be concrete encased burial Type EB, UL labeled utility duct, rated 90°C. Concrete encasement shall be red in color.
- F. If it complies with these Specifications, PVC conduit manufactured by one of the following will be acceptable: Carlon, Cantex, or JM Manufacturing.

2.7 CABINETS AND PULL BOXES

- A. Cabinets for lighting and power or any other purposes hereinafter specified or shown on the Drawings shall be constructed of panelboard code gauge galvanized steel with sides formed and corner seams welded before galvanizing.
- B. All cabinets and boxes shall be made of sheet metal unless otherwise indicated on drawings, and shall be provided with standard knockouts by the manufacturer, or without knockouts and shall be cut in the field by an approved cutting tool which will provide a clean, symmetrically cut opening.
- C. Pull boxes shall include all boxes used to reduce the run of conduit to the required number of feet or bends for cable, supports, taps, troughs, and similar applications and shall likewise be constructed as specified above.
- D. All cabinets and boxes shall be provided with panelboard code gauge fronts or doors as required which may be hinged or screwed as specified.
- E. Where required by the nature of the application or where specified, locks shall be provided and shall be Yale spring latch for single doors or vault type for double doors.

- F. Site pull or junction boxes shall be Quazite PC style or PG style polymer concrete or approved equal. Provide Tier 22 rating for boxes 10 feet or less from vehicular drives or parking areas. Tier 8 rating is acceptable for areas more than 10 feet from vehicular drives and parking areas.
- G. Pull or Junction boxes located in vehicular drives and parking areas shall be heavy duty re-enforced concrete type, traffic rated, and shall meet AASHTO H-20 unless specified otherwise on drawings.
- H. Boxes or cabinets shall not be less than 4-1/2" inches deep and their minimum size shall be determined per as follows:
 - 1. For straight pulls involving conductors of No. 4 and larger and for raceways of 3/4 inch and larger, the length shall be minimum of eight (8) times the diameter of the largest raceway plus the sum of the diameters of all other raceways in the same side of box or cabinet.
 - 2. For angle pulls or direction changes, distance between any entering raceway and the opposite side of the box shall be minimum of six (6) times the diameter of the largest raceway, and the minimum distance between raceway entries enclosing the same conductor shall not be less than six (6) times the diameter of the larger raceway. Additional raceways in the same wall shall require increase of these dimensions by the sum of the diameters of the other raceways.
 - 3. For below grade boxes in low voltage cable applications, the minimum size shall be 36 inches in the direction of travel and 24 inches wide for straight pulls. For angle pulls the minimum size shall be 36"x36".
- I. In no event shall any cabinet or box contain more than 20% of its cross-sectional area in conductors.
- J. Where conductors cross a box, a maximum of nine conductors may be laid parallel without the use of a barrier or compartment.
- K. Where junction box or pull box has dimensions over 36 inches on any side, conductors crossing such distances must be supported on approved racks or clamps in such a manner as to avoid unsupported spans greater than 36 inches.
- L. Where such boxes exceed 60 inches in any dimension, all conductors shall be supported, regardless of direction of travel.
- M. No conductors entering or leaving a cabinet or box shall be deflected in such a manner as to cause pressure to exist on the conductor insulation.
- N. All conduit, entering or leaving a cabinet or box shall be provided with insulated throat bushings or fittings for each size conduit involved.

2.8 SURFACE METAL RACEWAY

- A. Unless otherwise specified on drawings, furnish and install Wiremold surface metal type 2400 Plugmold and G-4000 series raceways, or an approved equal, as specified herein.

- B. The G-4000 raceway shall be divided into two separate compartments, one for data/communications cable and the remaining compartment for power. Provide appropriate receptacles, Cat 3 and Cat 5/6 data outlets as indicated on the Drawings.
- C. The 2400 Plugmold raceway shall have 20-amp single receptacles (white for normal power and red for emergency power) spaced every 12 inches on centers.
- D. Raceways shall be constructed with 0.050 inch galvanized steel and painted per Architect's specifications. The raceway shall be a minimum of 4-3/4 inches width and 1-3/4 inches deep.
- E. The coverplate shall be constructed of 0.040 inch galvanized steel and painted to match the raceway finish.
- F. Cover plates for receptacles shall match each device style. Data and telephone outlets shall have grommets knockouts. Coverplate for all devices and outlets shall be gang under a common coverplate.
- G. The raceway system shall be installed with all required accessories needed for a complete surface metal raceway system.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittals shall include, but not be limited to, the following:
 - 1. The Contractor shall submit to the Engineer for review, a list of the proposed manufacturers for each type of conduit, fittings and hangers selected from the manufacturers listed herein. The Contractor may install conduit, fittings and hangers furnished by any manufacturer listed on the approved submittal.
 - 2. Cut sheets of all conduits and fittings proposed.
 - 3. Additional information as required in Section 20 05 03.

3.2 INSTALLATION - GENERAL

- A. Conduit:
 - 1. All conduits shall be concealed in pipe chases, walls, furred spaces, or above the ceilings of the building unless otherwise indicated. Conduit shall not be embedded in any structural slab or structural member unless approved in writing by the structural engineer.
 - 2. Conduit may be run exposed in mechanical rooms, duct and piping chases, but only where necessary. All exposed conduit shall be run in the neatest, most inconspicuous manner, and parallel or perpendicular to the building lines.
 - 3. Boxes shall be installed in accessible locations.
 - 4. Conduit shall be sized in accordance with the percent fill requirements of the National Electrical Code, and as indicated on the drawings.

5. All conduit and surface raceways shall be adequately and properly supported from the building structure by means recommended by the manufacturer, or by the use of hanger rods or clamps as herein specified.
6. Where limited space is available above the ceilings and below concrete beams or other deep projections, conduit shall be hung below them and in a manner to provide maximum above-floor clearance with full coordination with other trades.
7. Run conduit to avoid proximity to heat producing equipment, piping and flues, keeping a minimum of 8 inches clear.
8. Whenever possible, install horizontal conduit runs above water piping.
9. Conduit systems which are exposed to the weather or water, or installed underground shall be made watertight. All exterior conduit shall be rigid galvanized. Use locator tape 12" above conduits for all underground conduit outside slab area.
10. Conduit routed above grade for telephone, signal, communication, fire alarm, security, audio/visual, or other low voltage systems shall be provided with pull boxes of approved sizes at intervals not exceeding 100 feet in length or after 270 degrees of bends, whichever occurs first, and/or where indicated on drawings.
11. Conduit routed below grade for telephone, signal, communication, fire alarm, audio/visual, security, or control systems shall be provided with pull boxes of approved sizes at intervals not exceeding 350 feet in length or after 270 degrees of bends, whichever occurs first, and/or where indicated on drawings.
12. Install all conduits to allow for adequate maintenance and access clearances to all equipment.
13. The Contractor shall study all Construction Documents and carefully lay out all work in advance of fabrication and erection in order to meet the requirements of limited spaces. Where conflicts occur, the Contractor shall take all steps necessary to resolve the conflict prior to erection of any work in the area involved.

B. Hangers and Supports:

1. All supports required for the proper installation of equipment and conduit shall be provided as hereinafter specified unless otherwise indicated on the Drawings.
2. All conduits throughout the building shall be supported 8 feet on centers horizontally and supported 6 feet on centers vertically, unless specifically noted differently on the Drawings or in the Specifications. The supports shall be from the structure on line of grade, with proper provision for expansion, contraction, vibration elimination, and anchorage.
3. Vertical conduits shall be supported from floor lines with riser clamps sized to fit the conduit and to adequately allow for contraction. At the bases of conduit, where required for proper support, provide anchor base fittings or other approved supports.
4. Conduit shall not be supported from ductwork, piping, ceiling suspension wires, ceiling support system, or other equipment.
5. All electrical conduits and surface raceways shall be run parallel or perpendicular to the adjacent building construction. All hangers shall be fastened to the building structure as specified herein.
6. Single conduits running horizontally in concealed areas shall be supported by B-line series, or approved equal, adjustable conduit hangers.

7. Where multiple conduits are run horizontally in concealed areas, they may be supported by trapeze channels suspended on rods or pipes. Channels shall be as manufactured by Kindorf, B-Line, Unistrut or approved equal.
8. Vertical conduits, both concealed and exposed, shall be supported by clamping to vertical surfaces or by means of clamps resting on adjacent beams, or floor slabs, or both as required by the installation.
9. Conduits and raceways run against building surfaces shall be supported by means recommended by the manufacturer, or by means of single or two hole rigid conduit clamps located 4 feet on center. Two-hole clamps shall be provided where size of conduit and installation conditions warrant.

C. Attachment:

1. The load and spacing on each hanger and/or insert shall not exceed the safe allowable load for any component of the support system, including the concrete which holds the inserts. Reinforcement at inserts shall be provided as required to develop the strength required.
2. All conduits not embedded in concrete or masonry shall be securely and independently supported so that no strain will be transmitted to outlet box and pull box supports, etc. Supports shall be rigid enough to prevent distortion of conduits during wire pulling.
3. Inserts shall be of a type which will not interfere with structural reinforcing, and which will not displace excessive amounts of structural concrete. All methods of attachment to the structure and the use of after-set inserts shall be approved in writing by the Structural Engineer.
4. All supports shall be designed and installed to avoid interference with all other conduits, hangers, ducts, building structures, piping, and equipment.

- D. Excavation and Backfill: The Contractor shall perform all excavation and backfill required for the installation of the underground raceway systems, duct banks and similar items, and shall resurface with materials to match the existing surface in all respects.

3.3 METAL CONDUIT - INSTALLATION

- A. Metal conduit shall be of ample size to permit the ready insertion or withdrawal of conductors without abrasion. All joints shall be cut square, reamed smooth, and drawn up tight. No non-flexible metal conduit shall be smaller than 3/4".
- B. Metal conduit shall not be embedded in structural slabs without prior written permission from the Structural Engineer. Metal conduits embedded in structural slabs shall be installed in the middle of the slab below the top and above the bottom reinforcing steel. Maintain a minimum concrete coverage of 1" except where penetration is made. Metal conduits embedded in structural slabs shall have watertight metal joints.
- C. Do not locate conduit in the following construction:
 1. In concrete slab where conduit has an outside diameter greater than one third of slab thickness.
 2. In a concrete slab less than 3-1/2" thickness. Local offsets are an exception.
 3. Between concrete slab reinforcing steel and bottom of slab.

- D. Concealed metal conduits shall be run in a direct manner, basically parallel to, and at right angles with the lines of the building, and with as long a bend as possible. Exposed metal conduit shall be run parallel to and at right angles with the lines of the building. All bends shall be field made using an approved bending machine designed for the purpose, or using standard ells having a radius no less than that shown in Chapter 9 - Table 2 of the National Electrical Code, and with approved fittings or connectors. All bends shall be free from dents or flattening. Not more than the equivalent of four quarter bends shall be used in any run between terminals and cabinets, or between outlets, junction or pull boxes.
- E. Keep conduits within the furring lines established on the architectural drawings unless conduits are shown or noted exposed.
- F. Provide all necessary sleeves and chases required where conduits pass through floors or walls. Seal all openings with approved fire stopping material to maintain integrity of wall or floor being penetrated. Finish to match adjacent surfaces after installation.
- G. Metal conduit shall be continuous from outlet to outlet, or from outlet to cabinets, junction or pull boxes, and shall enter and be secured at all boxes in such a manner that each system shall be electrically continuous throughout.
- H. Terminals of all conduit shall be furnished with bushings, double locknuts, connectors, etc., as specified herein and as required by the NEC. Install insulating bushings on the open ends of conduit not terminated in a panel, junction box, outlet, etc.
- I. So far as practicable, all exposed metal conduit shall be run without traps. Where traps or dips are unavoidable, a junction or pull box shall be placed at each low point.
- J. Metal conduit hangers and fasteners shall be of the types appropriate in design and in dimension for the particular applications and shall be securely fastened in place as specified herein.
- K. Each entire metal conduit system shall be installed complete before any conductors are drawn in. To guard against obstructions and omissions, each run of conduit shall be finished before plastering is installed. All metal conduits shall be swabbed after plaster is finished and dry.
- L. As soon as conduit has been permanently installed in place, conduit shall be capped or plugged with standard accessories.
- M. Where galvanized rigid steel conduit is used for underground raceways, they shall be field wrapped with 0.010-inch-thick anti corrosion tape 3M scotchwrap 51 or equal, applied with a 50% overlap, or shall have a factory-applied plastic resin, epoxy, or coal-tar coating system. The coating system or field wrapping shall be applied in all locations conduit is in contact with earth or in contact with concrete. Wrapping or coating shall encompass fittings. Zinc coating may be omitted from steel conduit which has a factory-applied epoxy system.
- N. At the Contractor's option, PVC conduit may be used for underground raceways in lieu of the galvanized rigid steel conduit or PVC coated rigid aluminum.

- O. Use locator tape 12" above conduits for all underground conduit outside slab area.
- P. All empty conduit systems shall have a 1/8" braided polypropylene rope or #14 galvanized steel pull wire installed. At least 12" of properly secured rope or wire shall be folded back into each end of the empty conduits. All empty conduits shall be labeled with a purpose.
- Q. Furnish and install approved expansion fittings with bonding jumpers where metal conduits cross building expansion joints. Expansion fittings shall be as manufactured by: OZ Gedney, Appleton or Crouse-Hinds.

3.4 FLEXIBLE METAL CONDUIT, LIQUID TIGHT FLEXIBLE METAL CONDUIT, MC CABLE - INSTALLATION

- A. Flexible metal conduit, liquid tight flexible metal conduit and MC cable shall be secured no less than every 54" and within 12" of a junction box. It is not acceptable to lay cables on ceiling, ductwork, etc.
- B. Where permitted by the local authority - MC Cable may be used indoors only for individual light fixture whips - provided the following conditions are met:
 - 1. The branch circuit homerun wiring is installed in the accessible ceiling plenum using metal conduit.
 - 2. Junction boxes are located in the accessible ceiling plenum in which fixtures are installed.
 - 3. Length of horizontal MC cable above ceiling is not greater than 6'-0".
 - 4. MC Cable shall not be run horizontally in partitions or to connect junction boxes.
- C. MC cable shall not be used for homerun wiring. Homeruns shall be hard piped with the use of metal conduit.

3.5 PVC CONDUIT - INSTALLATION

- A. Where PVC is used for cable systems with cable provided by other divisions, such as utility primary and low voltage systems, all elbows shall be Rigid Metal (RMC) with 36" minimum radius unless otherwise specified by the cable installer.
- B. For PVC conduit systems with cabling provided in this division, elbows shall be Rigid Metal (RMC). Bend radius may be standard or long sweep.
- C. All stub-ups above finished grade or finished floor shall be galvanized rigid steel(RMC) where exposed.
- D. All underground PVC conduit installed in ductbanks shall be installed using 2" duct spacers on 10' centers. All PVC conduits in slabs shall be securely tied and shall be run in a neat and orderly manner.
- E. Provide expansion fittings for PVC conduits where runs cross a building expansion joint, or where conduit is above grade and crosses from conditioned to unconditioned space.

- F. Unless otherwise noted on drawings, PVC conduit used for underground primary and secondary service or distribution shall be encased in minimum 3 inches of concrete with adequate steel reinforcing as required, and shall be installed using duct spacers on minimum 10' centers. The sides of trenches shall be formed in a manner to result in a concrete encasement plumb, straight, true without rough surfaces, off-sets, voids, or honeycomb. Reference Utility Company standards for additional information.

3.6 SURFACE METAL RACEWAY SYSTEM

- A. Surface metal raceway system shall be installed per manufacturers specifications and recommendations.
- B. Devices shall not be installed facing upwards unless specifically listed for this purpose.
- C. The raceway system shall be installed at the height specified by the Architect. The exact length of the raceway may require field adjustment in order to fit into the allocated space.
- D. The complete raceway shall be painted a color to match the Architects requirements.
- E. All receptacle devices and data outlets shall be installed at locations indicated on Drawings.

END OF SECTION

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SECTION 26 05 34

OUTLET BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07

1.2 SCOPE

- A. Furnish and install outlet, switch and junction boxes as shown, scheduled, specified and required.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Outlet, switch, and junction boxes and their installations shall comply with all requirements of the National Electric Code (NEC).

PART 2 - PRODUCTS

2.1 OUTLET, SWITCH, AND JUNCTION BOXES

- A. All metal outlet and junction boxes, except where otherwise specified, shall be of one- piece construction, and shall be protected against corrosion by an appropriate sheradizing process.
- B. All junction boxes shall be provided with covers of the same manufacturer as the boxes. The type of cover selected shall meet the conditions imposed in every case. All such boxes shall be left in a neat, clean and workmanlike manner.
- C. Outlet, switch and junction boxes for various uses shall be as manufactured by Appleton or an approved equal and shall be of the following types:
 - 1. **CONCRETE BOXES:**
 - a. In concrete slabs, where no fixtures are involved and the conduit size is 1/2 inch and 3/4 inch, the following shall be used: 4-inch

- octagonal concrete boxes of the appropriate depth, No. OCR Series; and No. OCP no-stud back plates.
- b. In concrete slabs, where fixtures are involved and the conduit size is 1/2 inch and 3/4 inch, the following shall be used: No. OCR Series inch octagonal concrete boxes of the appropriate depth, No. OCR Series; and No. OCP 3/8 back plate with fixture stud.
- c. All floor boxes containing power & data outlets are to be cast iron. Floor boxes shall be multi-gang recessed style with flip-top cover. No cast metal fittings. PVC floor boxes are not acceptable.
- d. For kitchen and wet areas provide tombstone outlet installed above floor surface area. Do not install floor boxes in wet areas such as kitchen, locker rooms, or training rooms.
- e. All floor boxes are to be recessed and shall have flush-mounted brass or stainless steel cover.
- f. If it complies with these Specifications, floor box equipment manufactured by one of the following will be acceptable: Hubbell, Wiremold, FSR.

2. RECEPTACLE BOXES:

- a. In standard partitions, where 3/4-inch conduits are employed: 4-inch square by 2-1/8-inch-deep boxes with 1-gang or 2-gang plaster covers shall be used, No. 4SD-SPL.
- b. In standard partitions, where conduits of a size greater than 3/4-inch are employed: 4-11/16-inch square by 2-1/8-inch-deep boxes with 1-gang or 2-gang plaster covers shall be used, No. 4SJD Series.
- c. In thin partitions measuring 3-1/2 inches or less: 4-inch square by 1-1/2-inch-deep boxes with 1-gang or 2-gang plaster covers shall be used, No. 4S-SPL.

3. WALL FIXTURE BOXES: For wall or bracket lighting fixture outlets, provide No. 400-SPL boxes in standard walls and No. 40SPL boxes in thin walls.

4. SWITCH BOXES:

- a. In standard partitions, where 3/4-inch conduits are employed: 4-inch square by 2-1/8-inch-deep boxes with 1-gang or 2-gang plaster covers shall be used, No. 4SD-SPL.
- b. 3-gang and up switch boxes, in standard walls or partitions, shall be 2-1/2" deep drawn style device boxes, with appropriate "gang" plaster covers as required. Field ganged type boxes are not acceptable for use.
- c. 1-gang/2-gang switch boxes in thin walls or partitions, shall be 1-1/2" deep square corner boxes with appropriate mounting bracket for attachment to studs, No. 222V Series.
- d. Provide gang barriers where required by the NEC.

- D. If it complies with these Specifications, equipment manufactured by one of the following will be acceptable: Raco, Steel City, or Appleton.

- E. Junction boxes and covers shall with identified and painted with the following scheme:
1. Lighting System: Yellow
 2. Emergency Power System: Red
 3. 120V Power System: Blue
 4. HVAC System Power: Green
 5. Panel and circuit number shall be completely legible on junction box cover at the completion of the project, prior to final punch list walk through.

2.2 TYPE FS AND FD SERIES UNILET BOXES

- A. Furnish and install type FS and FD series (copper free) Unilet boxes as specified herein and as shown on the drawings. Die-cast aluminum boxes are not acceptable.
- B. Type FS or FD Series (copper free) Unilet boxes with gasket cover plates shall be used in the following areas:
1. Where an atmosphere laden with moisture exists.
 2. Exterior areas where exposed to the weather or other wet locations. PVC coated.
 3. In commercial kitchens and associated areas. PVC coated.
 4. In Parking Garages 6'-0" AFF and below.
- C. If it complies with these specifications, equipment manufactured by one of the following manufacturers will be acceptable: Appleton, Crouse-Hinds, Killark, Red-Dot.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Shop drawing submittals shall include, but not be limited to, the following:
1. A list of the proposed manufacturers for each type of outlet, switch and junction boxes selected from the manufacturers listed herein. The Contractor may install outlet, switch and junction boxes furnished by any manufacturer listed on the approved submittal.
 2. Cut sheets of outlet, switch and junction boxes clearly highlighted.
 3. Additional information as required in Section 20 05 03.

3.2 INSTALLATION - GENERAL

- A. Refer to architectural drawings to determine whether outlets occur in wainscot or cabinet spaces and coordinate mounting heights as required by architectural form. For example, mounting heights of outlets occurring in a tile or brick wall should be adjusted so that the outlet may occur entirely within a single course. However, all outlets in a given space shall be mounted at the same height. Exact

location of all outlets shall be as shown on the Architectural Drawings and as approved by the Architect.

- B. In general, unless noted otherwise on Architectural or Electrical Drawings, mounting heights to device centerline shall be as follows:

EQUIPMENT/DEVICE	MOUNTING HEIGHT TO CENTERLINE
WALL SWITCHES	42" ABOVE FINISHED FLOOR.
RECEPTACLES, TELEPHONE, AND DATA OUTLETS	18" ABOVE FINISHED FLOOR.
RECEPTACLES	6" ABOVE COUNTERTOPS WITHOUT SPLASHBACKS AND 4" ABOVE SPLASHBACKS FOR COUNTERTOPS WITH SPLASHBACKS, MOUNTED WITH THEIR LONG AXIS HORIZONTAL.
CLOCK OUTLETS	90" ABOVE FINISHED FLOOR.
PANELBOARDS	72" FROM FINISH FLOOR TO TOP OF PANELBOARD.
STAIRWAY LIGHTING FIXTURES	WALL MOUNTED 7'-6" ABOVE FINISHED FLOOR OR MID-LANDING
FIRE ALARM PULL STATIONS	42" ABOVE FINISHED FLOOR. COORDINATE WITH ARCHITECTURAL GRAPHICS PACKAGED FOR ACTUAL MOUNTING HEIGHTS.
FIRE ALARM WALL MOUNTED AUDIO/VISUAL SIGNALS	6'-8" ABOVE FINISHED FLOOR.
WALL TELEPHONE OUTLETS	42" ABOVE FINISHED FLOOR.

- C. All receptacles shall be mounted with their long axis vertical, unless noted otherwise.

3.3 OUTLET, SWITCH AND JUNCTION BOXES - INSTALLATION

- A. All junction boxes shall be marked to identify the circuit(s) within the box.
- B. Junction boxes utilized for emergency circuits shall be painted red in color where emergency circuits are indicated on drawings.
- C. Outlet boxes with plaster rings shall be finished to 1/8 inch of the finished surface.
- D. Outlet boxes installed in fire-rated partitions (2 hour or less) shall not exceed 16 square inches, with a maximum of 100 square inches of wall opening per 100 square feet of wall area.
- E. The outlet boxes on opposing sides of fire and smoke rated partitions shall be located whereby no two (2) outlet boxes are installed closer than 24" on center laterally, and securely attached to the partition studs, with at least one (1) partition stud separating the outlet boxes.
- F. Where outlet or switch boxes are not supported from studs or joints directly, they shall be supported by expandable clip type bar hangers, Appleton Catalog No. SX 18 or SX 26. In no case shall conduit be used to support switch or outlet

boxes. It is not acceptable to support switch or outlet boxes from drywall material only.

- G. The following requirements shall apply to exposed as well as concealed conduit systems when "gang" boxes shall be used. These "gang" boxes shall have dimensions which are not smaller than those shown in the following table:

NUMBER IN GANG	SIZE
3	4-1/2" x 8-5/8"
4	4-1/2" x 10-1/2"
5	4-1/2" x 10-1/2"
6	4-1/2" x 14"

- H. In instances in which "gang" boxes are located in woodwork, wooden partitions, or all plaster partitions; the depth of the boxes shall be reduced to 1-5/8".
- I. Switch boxes shall not be used as junction boxes.
- J. On all ceiling outlets involving fixture-hanging boxes, 1/2" no-bolt fixture studs shall be used for heavy loads.
- K. Pull boxes, junction boxes, and outlet boxes shall be located no more than 30" above an accessible ceiling or 30" above an access panel unless noted otherwise on drawings.

3.4 FS AND FD UNILET BOXES - INSTALLATION

- A. Standard wiring devices may be used for cord and cap connection of portable equipment provided the FS or FD Unilet boxes are mounted not less than 18 inches above the finish floor or finish grade, and the gasketed cover plates employed shall be adapted for the particular application involved. In all cases, brass screws shall be used.
- B. Type FS or FD Series (copper-free) Unilet boxes used for connections to permanently install, free standing equipment in all areas of kitchens and associated areas shall be provided with gasketed cover plates and shall be wired to the equipment utilizing plates and shall be wired to the equipment utilizing water tight flexible metal conduit and approved watertight fittings. Boxes shall be installed no less than 18" above finish floor or finish grade.
- C. Due provisions shall be made in all cases for the escape of any condensate which might accumulate.

END OF SECTION

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SECTION 26 24 16

CIRCUIT BREAKER DISTRIBUTION PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07
 - 6. Power System Studies 26 05 73

1.2 SCOPE

- A. General: Furnish and install circuit breaker distribution panels as shown, scheduled and specified.
- B. All service equipment shall be marked in the field to comply with NEC Section 110.
- C. Provide Arc Flash Hazard Analysis to comply with NFPA 70E Section 130.3.

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
- B. Distribution Panels and Panelboards:
 - 1. GE by ABB
 - 2. Square D / Schneider Electric
 - 3. Siemens
- C. Codes and Standards:
 - 1. All products shall be manufactured in the USA.
 - 2. Circuit breaker distribution panels shall be listed by Underwriter's Laboratories and shall bear the UL label.
 - 3. Distribution panels shall be in accordance with Underwriter's Laboratories, Inc., "Standard for Panelboards".

PART 2 - PRODUCTS

2.1 CIRCUIT BREAKER DISTRIBUTION PANELS

- A. General: Furnish and install circuit breaker distribution panels as specified herein and as scheduled and shown on the Drawings. Panels shall be thermal-magnetic, molded case circuit breaker, dead-front type as scheduled and shall be rated for the intended voltage. When required, panels shall be suitable for use as service equipment.
- B. Cabinets: Panel cabinets shall be code gauge galvaneel or galvanized steel, NEMA 1 for indoor locations or NEMA 3R for outdoor locations and shall have a door covering the breaker operating handles. Cabinets shall be of sufficient size to allow a width of gutter to conform with Underwriter's Laboratories Standards. Panel trim shall be full finish sheet steel finished with two coats of paint, the first being a primer coat the second a finish coat of light gray lacquer. Cabinet trim doors shall be equipped with a latch and tumbler type lock. Doors over 48" long shall be equipped with a three-point latch and vault lock. All panel locks shall be keyed alike.
- C. Interiors: The panel interior assembly shall be dead front with panel front removed. Main lugs or main circuit breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers.
- D. Door in Door: Panel Cabinets shall be door in door construction such that all wiring compartments can be accessed from a hinged lockable door.
- E. Directory Cards: Circuit directory cards shall be provided. Cardholder shall be permanently attached on the inside face of the Distribution Panelboard door. Directory cards shall be typewritten with description of loads served.
- F. Bus: Distribution panelboard busing shall be silver plated copper. Bus structure and mains shall have ratings as shown and scheduled. Such ratings shall be established as shown and scheduled. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 65°C rise above 40°C ambient. Heat rise test shall be conducted in accordance with UL 67. The use of conductor dimensions in lieu of actual heat tests will not be acceptable. All bus joints shall be bolted with medium carbon steel, cadmium plated hardware, equipped with lock washers and torqued to the Manufacturer's recommended settings (usually ASTM standards). Furnish an isolated neutral bus and a ground bus inside each panelboard enclosure. All two-section panelboards shall be connected with copper cable, with an ampacity meeting or exceeding the main bus ampacity.
- G. Lugs: Panel bus shall be arranged to accommodate copper bodied, compression connectors at the main lug connection of #8 AWG, or larger copper conductors and aluminum alloy compression connectors for all aluminum conductors. See the Section entitled "Conductors" for connector specifications. Bolts shall be captive or shall be studs to facilitate re-installation of the lugs with the wire attached. Adequate wiring space shall be provided to accommodate the compression connectors.

H. Short Circuit Rating/Testing:

1. Each panel, as a complete unit, shall have an integrated equipment short circuit current rating equal to the integrated equipment rating shown on the Drawings. This rating shall be established by testing with the overcurrent devices mounted in the panel. The short circuit testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying the specified panel short circuit current or greater.
2. Testing of panel overcurrent devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure by applying fixed fault to the bus structure alone is not acceptable. Panels shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed as such.

- I. Meters: Install digital metering device on all main switchgear and main distribution panels serving gyms, kitchen, cafeteria, exterior athletic areas, auditoriums, and extended day area.

J. Circuit Breakers:

1. Any of the listed manufacturers may submit fused switch construction equipment as a price alternate. Base bid shall be breaker construction as specified herein.
2. Devices with trip ratings of 1200 Amps or more, including devices which can be adjusted to 1200 Amps, shall include Energy Reduction Maintenance switch features, including indicator lights.
3. Devices 700 Amps through 1200 Amps shall be molded case circuit breakers, U.L. listed for 80% continuous current. Circuit breaker handle accessories shall have provisions for locking in the "ON" or "OFF" position. Provide a push-to-trip button to mechanically operate the circuit breaker tripping mechanism. The entire trip system shall be micro processor-based, true RMS sensing design with adjustable long-time ampere rating and delay, adjustable short-time pickup and delay, adjustable instantaneous, and where shown on the Drawings, adjustable ground-fault pick-up and delay. Provide visual indicators for overload, short-circuit and ground-fault trip functions. Where ground fault is indicated, a residual ground-fault system shall be provided with integral testing means and a separate neutral current transformer. Provide a portable test set if integral trip function is not available.
4. Devices 200 Amps through 600 Amps shall be current limiting molded case circuit breakers, U.L. listed for 80% continuous currents. Circuit breaker handle accessories shall have provisions for locking in the "ON" or "OFF" position.
5. Devices 20 Amps through 175 Amps shall be molded case solid-state RMS sensing circuit breakers with adjustable instantaneous or thermal magnetic trip units.
6. Provide distribution panel circuit breakers with conventional interrupting capacity, or high interrupting capacity as required by the system available fault current loads as indicated on the Drawings. Where no AIC is indicated on Drawings, 120/240-volt circuit breakers and 277/480 volt circuit breakers shall have a minimum IC rating of 22 kAIC and 65 kAIC respectively.

- K. Spaces: Where space for future breakers are shown, panelboard enclosure shall include removable blank panels or knockouts to allow installation of future breakers and panelboard busing shall be complete, including all required connectors.
1. Unless otherwise indicated on drawings, provide three(3) breaker spaces suitable for minimum 18% of bus capacity each.
 2. All spaces shall accommodate overcurrent device with KAIC ratings matching the panel KAIC.

PART 3 - EXECUTION

3.1 CIRCUIT BREAKER DISTRIBUTION PANELS

- A. Power system studies shall be submitted at the same time as the electrical gear associated with the studies. Engineer will not approve electrical gear submittals without a concurrent review of the power system studies.
- B. Shop drawing submittal shall include, but not be limited to, the following:
1. Cut sheets of the circuit breaker distribution panels with construction, circuit breaker amperage and poles, interrupting ratings, and quantities clearly listed, and with bus amperage, voltage, phase and wires, interrupted equipment ratings and all associated accessories clearly indicated.
 2. Additional information as required in Section 20 05 03.
- C. INSTALLATION
1. Install panelboards and enclosures, as shown, including electrical connections, in accordance with the manufacturer's written instructions, the applicable requirements of NEC and recognized industry practices to ensure that products serve the intended function.
 2. Coordinate installation of panelboards and enclosures with cable and raceways installation work.
 3. Anchor enclosures firmly to walls and structural surfaces ensuring that they are permanently and mechanically secured. Provide unistrut racks where walls cannot support panels.
 4. Install each floor-mounted power distribution panelboard on a 4-inch reinforced concrete housekeeping pad. The housekeeping pad shall extend 3-inches beyond the housing of the distribution panel, any block outs, dimensions, and location of the concrete work.
 5. Refer to Section 20 05 05 for engraved nameplates for distribution panels and individual devices.
 6. Contractor shall provide a thermographic test using an independent testing laboratory. Refer to Section 26 05 07 for testing requirements.
 7. Type the panelboard circuit directory card upon completion of work.
 8. For renovation projects, provide a new circuit directory card for any and all panels where additions or modifications to existing circuits have been performed. The new circuit directory card shall show existing and new load descriptions. Directory card shall match existing load descriptions for any existing panelboard schedules on new panelboard inserts.

END OF SECTION

SECTION 26 24 17

CIRCUIT BREAKER LIGHTING AND POWER PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07

1.2 SCOPE

- A. General: Furnish and install circuit breaker lighting and power panelboards as shown, scheduled and specified.
- B. All service equipment shall be marked in the field to comply with NEC Section 110.
- C. Provide Arc Flash Hazard Analysis to comply with NFPA 70E Section 130.3.

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
- B. Lighting and Power Panelboards:
 - 1. GE by ABB
 - 2. Square D / Schneider Electric
 - 3. Siemens
- C. Codes and Standards:
 - 1. All products shall be manufactured in the USA.
 - 2. Power distribution equipment shall be listed by Underwriter's Laboratories and shall bear the UL label.
 - 3. Lighting and power panelboards shall be in accordance with Underwriter's Laboratories, Inc., "Standard for Panelboards".

PART 2 - PRODUCTS

2.1 LIGHTING AND POWER PANELBOARDS

- A. General: Furnish and install circuit breaker lighting and receptacle panelboards as specified herein and as shown on the drawings. Panelboards shall be automatic circuit breaker, dead front type and shall be rated for the intended voltage.
- B. Cabinets: Panelboards shall be mounted in enclosing cabinets, consisting of a code gauge galvanized sheet steel box with trim and door. Panelboard cabinets shall be of sufficient size to allow a width of gutter to conform with Underwriters' Laboratories standards. Cabinets shall be NEMA 1 for indoor installations. All exterior installations shall be in a NEMA 3R enclosure. Provide NEMA 4X stainless steel or other enclosures where indicated on the plans.
- C. Cabinet Trim: The trim shall be manufactured from one piece of full finish sheet steel, finished with two coats of paint, the first being a prime coat and the second a finish coat of light gray lacquer. Trim for panelboards installed in kitchens shall be stainless steel. The trim on surface mounted panels shall be fastened to the cabinet by means of screws or "approved" adjustable clamps. Trims on flush mounted panels shall have concealed fasteners. All trims shall have a door equipped with tumbler lock catch combination, two keys being supplied with each lock. All locks shall be keyed alike.
- D. Directory Cards: Circuit directory cards shall be provided. Cardholder shall be permanently attached on the inside face of the panelboard door. Directory cards shall be typewritten with description of loads served.
- E. Bus: Panelboard busing shall be silver plated copper. Bus structure and mains shall have ratings as shown and scheduled. Such ratings shall be established as shown and scheduled. Such rating shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 65°C rise above 40°C ambient. Heat rise test shall be conducted in accordance with UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat test. All bus joints shall be bolted with medium carbon steel, cadmium plated hardware equipped with lock washers and torqued to the Manufacturer's recommended settings. Furnish an isolated neutral bus and an insulated ground bus inside each panelboard enclosure. All two-section panelboards shall be connected with copper cable, with an ampacity meeting or exceeding the main bus ampacity. Provide 200% neutral bus and isolated ground bus where indicated on the drawings or panel schedules.
 - 1. Busing shall be of the "sequence" type so that multi-pole breakers can be substituted for single-pole breakers without bus or assembly rearrangement. All 208Y/120V receptacle panelboards shall be furnished with a separate ground bus and an isolated neutral bus.
- F. Lugs: Panel bus shall be arranged to accommodate copper bodied, compression connectors at the main lug connection of #8 AWG, or larger copper conductors and aluminum alloy compression connectors all aluminum conductors. See the Section entitled "Conductors" for connector specifications. Bolts shall be captive or shall be studs to facilitate re-installation of the lugs with the wire attached. Adequate wiring space shall be provided to accommodate the compression connectors.

- G. Spaces and Spares: Where space for future breakers are shown, panelboard enclosure shall include removable blank panels or knockouts to allow installation of future breakers and panelboards busing shall be complete, including all required connectors.
1. Unless otherwise indicated on Drawings, all spaces shall be filled with spare breakers.
 2. Unless otherwise indicated on Drawings, assume all panels are minimum 60 circuits.
 3. All breaker spaces shall accommodate breakers with KAIC ratings matching the panel KAIC.
- H. Short Circuit Rating: Panelboards shall be braced for an integrated equipment rating equal to the interrupting rating of the branch breaker with the lowest interruption rating. Where no AIC is indicated on Drawings, the minimum integrated equipment rating shall be 10,000 AIC for 120/208 Volt panel boards and 65,000 AIC for 277/480-volt panel boards.
- I. Circuit Breakers:
1. All single-pole circuit breakers shall be either ambient or case-compensated (calibrated 40°C.) thermal-magnetic type breakers, with inverse time delay on overloads and instantaneous magnetic trip on short circuits. (Twin, tandem and half-size single-pole breakers are not acceptable.)
 2. All multiple-pole breakers shall be common trip, thermal-magnetic type, calibrated 40°C.
 3. The breakers shall employ quick-make, toggle mechanism for manual operation, as well as automatic operation. The breakers shall have provisions for manually testing the tripping mechanism with the breaker removed from the panel. Automatic tripping shall be indicated by the breaker handle assuming a clearly distinctive position from the manual "on" and "off" positions.
 4. All breakers 15 ampere through 100 ampere shall be heating, air conditioning and refrigeration rated (HACR).
 5. Circuit breakers used as switches in 120V and 277V fluorescent lighting circuits, the circuit breakers shall be approved for such switching duty and shall be marked "SWD".
 6. 480Y/277V, 3 phase, 4 wire, panelboards shall have circuit breakers with bolt-in connections to the main buses. Interrupting rating of the branch breakers shall be 14,000 AIC, unless noted otherwise.
 7. 208Y/120V, 3 phase, 4 wire, panelboards shall have circuit breakers with bolt-in connections to the main buses. Interrupting rating of the branch breakers shall be minimum 10,000 AIC, unless noted otherwise.
 8. Provide breakers suitable for reverse-feed or back-feed where indicated for connection to green energy production systems such as solar photovoltaic or wind systems.

PART 3 - EXECUTION

3.1 LIGHTING AND POWER PANELBOARDS

- A. Shop drawing submittal shall include, but not be limited to, the following:

1. Cut sheets of the circuit breaker lighting and receptacle panelboards, construction, with circuit breaker type, amperage, poles and interrupting ratings, integrated equipment ratings and quantities clearly listed, and with bus amperage, voltage, phase and wires, and all associated accessories clearly indicated.
2. Additional information as required in Section 20 05 03.

B. INSTALLATION

1. Install panelboards and enclosures, as shown, including electrical connections, in accordance with the applicable requirements of NEC and recognized industry practices to ensure that products serve the intended function.
2. Coordinate installation of panelboards and enclosures with cable and raceways installation work.
3. Anchor enclosures firmly to walls and structural surfaces ensuring that they are permanently and mechanically secured. Provide unistrut racks where walls cannot support panels.
4. Refer to Section 20 05 05 for panelboard engraved nameplates.
5. Contractor shall provide a thermographic test using an independent testing laboratory. Refer to Section 26 05 07 for testing requirements.
6. Type the panelboard circuit directory card upon completion of work.
7. For renovation projects, provide a new circuit directory card for any and all panels where additions or modifications to existing circuits have been performed. The new circuit directory card shall show existing and new load descriptions. Directory card shall match existing load descriptions for any existing panelboard schedules on new panelboard inserts.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07

1.2 SCOPE

- A. General: Furnish and install wiring devices as shown, scheduled, specified, and required.
- B. Types: The types of wiring devices include, but are not limited to, the following:
 - 1. Receptacles
 - 2. Plugs
 - 3. Wall Switches
 - 4. Wall Plates
 - 5. Wall Box Dimmer Switches
- C. All wiring devices shall be side-wired.

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
 - 1. Hubbell
 - 2. Leviton
 - 3. Lutron
 - 4. Pass & Seymour-Legrand

PART 2 - PRODUCTS

2.1 WIRING DEVICES – ALL TYPES

- A. All devices shall be specification grade or higher.
- B. Wiring device color shall be reviewed with the owner/architect and required local codes and standards.
 - 1. General purpose receptacles: Gray
 - 2. Isolated ground receptacles: Orange
 - 3. Emergency receptacles: Red
- C. All device wall plates shall be stainless steel.
- D. All wiring devices shall be rated for 20 amps minimum.

2.2 RECEPTACLES – NON-TAMPER RESISTANT

- A. Public facing duplex receptacles shall be flush, NEMA 5-20R, 20A, 125V, 3 wire, integral one-piece grounding backstrap, decorator style. Receptacles shall be specification grade.
- B. Non-public facing duplex receptacles in equipment rooms or similar locations shall be NEMA 5-20R, 20A, 125V, 3 wire, side and back wire, integral one-piece grounding backstrap, standard style. Fed Spec W-C-596. Receptacles shall be specification grade.

2.3 RECEPTACLES – TAMPER RESISTANT

- A. Duplex receptacles shall be flush, NEMA 5-20R, 20A, 125V, 3 wire, grounding, type. Receptacles shall be specification grade, decorator style, tamper resistant with Brass mounting strap.

2.3 RECEPTACLES – TYPICAL REQUIREMENTS

- A. Ground Fault Circuit Interruption (GFI) duplex receptacles wired to "normal" power circuits shall be flush, NEMA 5-20R, 20A, 125V, 2 pole, 3 wire, self-test technology, weather resistant duplex, decorator style with nominal sensitivity to earth leakage of 4-6 mill amperes, and feed through capabilities. Receptacles shall be specification grade.
- B. USB Charger type receptacles shall be 20A, 125V commercial specification grade, tamper resistant with two USB Type 2.0 ports, minimum 5.0A, 5V DC output total Decorator Type Duplex receptacle.
- C. Special receptacles shall be provided with NEMA configuration as shown on the drawings and a matching NEMA configuration plug for installation on the equipment cord.
- D. Twist lock receptacles shall be industrial grade Hubbell Twist-Lock Series, Leviton locking series, or Pass & Seymour "Black and White" series.

- E. All weatherproof duplex receptacles shall have cast aluminum or stainless steel weatherproof while-in-use cover with NEMA 3R rating and flip lid; Hubbell #WP26E series or approved equal.

2.4 PLUGS

- A. Cord connectors and plugs with twist lock devices shall be industrial specification grade Hubbell Twist-Lock series, Pass & Seymour "Turnlock" series.
- B. Cord connectors and plugs with straight blade shall be specification grade Hubbell Insulgrip Plugs and Connector Bodies, Pass & Seymour "Black and White" series.

2.5 WALL SWITCHES

- A. All locally switched lighting circuits in public areas, such as those areas accessible to employees, residents, or patrons shall be supplied with 20A, 120/277 Volt, specification grade, AC quiet, rated for 50,000 operations, decorator style rocker type switches as follows:
 - 1. Single pole rocker switches shall be Hubbell DS120X, Leviton #5621-2X.
 - 2. Double pole rocker switches shall be Hubbell DS220 X, Leviton #5622-2 X.
 - 3. Three-way rocker switches shall be Hubbell DS320 X, Leviton #5623-2 X.
 - 4. Four-way toggle switches shall be Hubbell DS420 X, Leviton #5624-2 X.
 - 5. Locally switched "emergency" power lighting circuits shall be supplied with toggle switches similar to "normal" power circuits specified above, except color shall be "red, Hubbell DSx20R series."
- B. All locally switched normal power lighting circuits in non-public areas, such as equipment rooms, shall be supplied with 20A, 120/277 Volt, specification grade, AC quiet, toggle type switches as follows:
 - 1. Single pole toggle switches shall be Hubbell #1221X, Pass & Seymour CSB20AC1X
 - 2. Double pole toggle switches shall be Hubbell #12212X, Pass & Seymour SB20AC2X.
 - 3. Three-way toggle switches shall be Hubbell #1223X, Pass & Seymour CSB20AC3X.
 - 4. Four-way toggle switches shall be Hubbell #1224X, Pass & Seymour CSB20AC4X.
 - 5. Locally switched "emergency" power lighting circuits shall be supplied with toggle switches similar to "normal" power circuits specified above, except color shall be "red".
- C. Key-operated switches shall be specification grade Hubbell #HBL1221LW, Leviton #1221-2WL with white key guide, or Pass & Seymour #PS20AC1L and shall meet all the requirements of the rocker type switches. Key-operated switches shall have full size key cylinders that shall utilize Fort Bend ISD standard key way locks. Coordinate with Fort Bend ISD for key way type.
- D. General purpose toggle type (snap) disconnect switches for single phase equipment (i.e., water heaters, etc.) shall be Hubbell #HBL3031-I, Pass & Seymour #PS30AC1-I,

30A 120/277-volt, grounding, and shall be mounted in metallic single gang box with coverplate, located adjacent to the unit or equipment being served.

- E. Timer switches shall be Intermatic #FD series, 125 Volt, 20 Amp, 3 Wire, 10 Amp @ 277V, 1 Horsepower or as specified on Drawings. Equals will be accepted.

2.6 WALL PLATES

- A. Device plates for single and multi-gang wiring devices in all areas shall be 302 stainless steel configured to match the installed device, unless specified otherwise. Multi-gang installations shall be provided with a common coverplate.
- B. Combination receptacle, TV and communication outlets shall be combined with a single wall plate to match each outlet.
- C. Twistlock receptacles shall be provided with a 302 stainless steel coverplate for interior spaces to match the installed device, Hubbell SS series.

2.7 WALL BOX DIMMER SWITCHES

- A. Where wall box dimmer switches are indicated or specified, they shall be solid-state, specification grade, with stainless steel coverplate to match adjacent wiring devices, as follows:
 - 1. 600W single pole, Lutron #NT-600.
 - 2. 1000W single pole, Lutron # NT-1000.
 - 3. 1500W single pole, Lutron # NT-1500.
 - 4. 1500W single pole, low voltage, Lutron #NTLV-1500

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. Submittals shall include, but not be limited to, the following:
 - 1. Cut sheets of the specified receptacles, wall switches, wall plates, dimmer switches, etc.
 - 2. Additional information as required in Section 20 05 03.

3.2 INSTALLATION

- A. Receptacles throughout shall be installed with the ground pin receiver in the “up” position.
- B. Special purpose switches and/or outlets not covered by the specifications but noted on the drawings shall be of the amperage, voltage rating, and NEMA configuration indicated. The switches and/or outlets shall be specification grade of the same quality as those specified.
- C. Coordinate with the owner the exact receptacle type required for owner furnished equipment.

- D. When equipment only, or J-Box only, is indicated for equipment, it shall be the responsibility of the Electrical Sub-contractor to obtain from the supplier, the complete data as related to the electrical portion of the equipment, including rough-ins, mounting height, type of outlet, items furnished by the supplier, etc. The Electrical Sub-contractor shall be responsible for furnishing and installing all materials that are usually the Electrical Subcontractor's responsibility with the installation of the equipment.
- E. For typical areas, multi-gang wall plates shall be used for each group of ganged devices. Mounting screws shall be installed for each device covered by the wall plate.
- F. Wall plates for concealed work shall be flush against the finished wall and shall completely cover the wall opening. Wall plates shall not be installed until all painting has been completed. Devices shall be protected by masking tape or other coverage until painting is complete. Any device with paint on it shall be replaced at no expense to the Owner.
- G. Where normal power and emergency power receptacles or switches are ganged together in one box, install a permanent partition to separate normal and emergency power.

END OF SECTION

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SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07

1.2 SCOPE

- A. General: Furnish fuses as shown, scheduled and specified.

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
- B. Fuses:
 - 1. Bussmann
 - 2. Ferraz Shawmut
 - 3. LittleFuse
- C. Codes and Standards:
 - 1. Fuses shall be listed by Underwriter's Laboratories and shall bear the UL label.

PART 2 - PRODUCTS

2.1 FUSES

- A. Furnish and install all fuses as specified and as indicated on the drawings.
- B. Fuses shall not be installed until equipment is ready to be energized. This measure prevents fuse damage during shipment of the equipment from the manufacturer to the job-site or from water that may contact the fuse before the equipment is installed.

- C. All fuses shall be furnished and installed by the Electric Contractor. Fuse holders shall be labeled inside the cover to indicate the type and ampacity of fuses installed. All fuses shall be of the same manufacturer.
- D. Mains, Feeders, and Branch Circuits 601 to 6000 Amperes shall be protected by UL Class L, current limiting fuses, BUSSMAN LOW-PEAK time delay Type "KRP-C-SP". Fuses shall be time-delay type and must hold 500% of rated current for a minimum of 4 seconds, clear 20 times rated current in .01 seconds or less and shall be listed by Underwriters Laboratories Inc., with an interrupting rating of 300,000 Amperes RMS symmetrical.
- E. Mains, Feeders, and Branch Circuits 0 to 600 Amperes shall be protected by UL Class RK1, current limiting fuses, BUSSMANN LOW-PEAK dual-element fuses, Type "LPN-RK-SP" (250 Volts) and "LPS-RK-SP" (600 Volts) unless otherwise noted. Fuses shall be time delay type must hold 500% of rated current for a minimum of 10 seconds and clear 20 times rated current in .01 seconds or less and shall be listed by Underwriters Laboratories Inc., with an interrupting rating of 300,000 Amperes RMS symmetrical. Fused Busway plug type switches shall utilize Class J fuses, Bussmann "LPJ-SP".
- F. All individual motor circuits with full load ampere ratings of 480 amperes or less, shall be protected by BUSSMANN LOW-PEAK dual element fuses "LPN-RK-SP", or "LPS-RK-SP".
 - 1. The following guidelines apply for motors protected by properly sized overload relays: fuses for motors with a marked service factor not less than 1.15 shall be installed in ratings of 125 percent of motor full load current (or next larger if 125 percent does not correspond to a fuse size) except where high ambient temperatures prevail, or where the motor drives a heavy revolving part which cannot be brought up to full speed quickly, such as large fans. Under such conditions, the fuse may be 150 percent to 175 percent of the motor full load current. Larger H.P. motors shall be protected by BUSSMANN LOW-PEAK Time-Delay "KRP-C-SP" fuses of the ratings shown on the Drawings. For all other motors, (such as 1.0 service factor motors) fuses shall be sized in ratings of 115 percent of the motor full load current (or next larger if 115 percent does not correspond to a fuse size) except as noted above.
 - 2. The following guidelines apply where fuses are used as the only overload protection for the motor: for motors with a 1.15 service factor or more, fuses should be sized at 125 percent of motor full load current or next size smaller if 125 percent does not correspond with to a fuse size. For all other motors, fuses should be sized at 115 percent of motor full load current, or next size smaller, if 115 percent does not correspond to a fuse size. The fuses shall be U.L. Class RK1, dual-element time-delay.
- G. All other fused switches shall be provided with cartridge fuses which shall be of the knife blade or ferrule type with capacities as indicated on the Drawings. Fuses shall be Bussmann "Fusetrons" of the proper voltage.

H. Spare Fuses:

1. Upon completion of the building, the Electrical Contractor shall provide the Owner with spare fuses as shown below:
 - a. 10% (minimum of 3) of each type and rating of installed fuses shall be supplied as spares.
 - b. BUSSMANN Catalog No. SFC or equal spare fuse cabinets with engraved nameplates shall be provided to store the above spare fuses.
- I. The contractor shall base his proposal upon the fuses specified. If the contractor wishes to use fuses other than those specified, written request shall be submitted to the Engineer for approval review as required in the BASIC DIVISION 20-28 REQUIREMENTS Section 20 05 03, under "PRIOR APPROVAL", together with proof that the substituted fuses "are equal", and that all proposed fuses have been selected for proper fuse coordination with all components of the power system.

PART 3 - EXECUTION

3.1 FUSES

- A. Shop drawings submittal shall include, but not be limited to, the following:
 1. Cut sheet submittal shall be provided for all fuse types required for the project.
 2. Cut sheet submittal shall be provided for in-line fuse holders for all required lighting fixtures.
 3. Additional information as required in Section 20 05 03.
- B. INSTALLATION
 1. Install appropriate fuses in switches after switch and related enclosure installation, wiring and testing is complete.
 2. Install fuse-identifying labels on the door of each fused device. Labels shall indicate the type and ratings of the proper fuse to be used in the switch.

END OF SECTION

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SECTION 26 28 16

SAFETY AND DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, Division 20, and Drawings apply to all Work herein.
- B. Requirements of the following Division 20-28 Sections apply to this section:
 - 1. Basic Division 20-28 Requirements - Section 20 05 03
 - 2. Schedule of Submittal Data - Section 20 05 04
 - 3. General Division 20-28 Materials and Methods - Section 20 05 05
 - 4. Scope of Work - Section 26 05 01
 - 5. Testing - Section 26 05 07
 - 6. Power System Studies - Section 26 05 73

1.2 SCOPE

- A. General: Furnish and safety and disconnect switches as shown, scheduled and specified.
- B. All service equipment shall be marked in the field to comply with NEC Section 110.

1.3 QUALITY ASSURANCE

- A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:
- B. Safety and Disconnect Switches:
 - 1. GE by ABB
 - 2. Square D
 - 3. Siemens
- C. Codes and Standards:
 - 1. Safety and disconnect switches shall be listed by Underwriter's Laboratories and shall bear the UL label.

PART 2 - PRODUCTS

2.1 SAFETY AND DISCONNECT SWITCHES

- A. Furnish and install safety switches as specified herein and as indicated on the drawings with number of switched poles as indicated.
- B. Safety switches shall be heavy duty type, dead-front, sheet steel enclosed, surface mounted, of the type and size indicated. Safety switches shall be rated for the voltage of the circuit in which they are installed. Safety switches used as motor disconnects shall be horsepower rated for the motor served.
- C. Safety switches shall be quick-make, quick-break type with permanently attached arc suppressor and constructed such that blades are visible in the OFF position with the door open. All current carrying parts shall be constructed of high conductivity copper with silver-plated switch contacts. Lugs shall be suitable for copper cable, shall accept compression connectors where required, and shall be front removable. Fuse clips shall be positive pressure rejection-type, suitable for use with UL Class R fuses typical. Provide class J fuse holders for fused busway plug in switches and any switches used in series rating combinations. The operating handle shall be part of the box, not of the cover.
- D. The switch shall have provisions to padlock in the off position. Safety switches shall have a cover interlock to prevent unauthorized opening of the switch door when the switch mechanism is in the "on" position. Cover interlock shall have an override mechanism to permit switch inspection by authorized personnel.
- E. For switches serving fire pumps, provide padlocking provisions in both the open and closed positions. Provide auxiliary contacts for monitoring switch in closed position.
- F. Where a neutral is present in the circuit, furnish an isolated solid neutral block with the safety switch. Where a ground conductor is present in the circuit, furnish a solid ground block with the safety switch. Where an isolated ground is present in the circuit, furnish an isolated ground block.

PART 3 - EXECUTION

3.1 SAFETY AND DISCONNECT SWITCHES

- A. Shop drawing submittal shall include, but not be limited to, the following:
 - 1. Cut sheets of the safety and disconnect switches with ratings, voltage, poles, and all associated accessories clearly indicated.
 - 2. Additional information as required in Section 20 05 03.
- B. INSTALLATION
 - 1. Indoors: Safety switches installed in indoor locations shall be NEMA 1 general purpose enclosures, unless otherwise indicated.
 - 2. Outdoors: Safety switches installed in outdoor locations shall be NEMA 3R (water resistant) enclosures, unless otherwise indicated.

3. Wet Areas: Safety switches installed at cooling towers, kitchen and laundries and in other wet areas, shall be NEMA 4X (stainless steel) enclosures, unless otherwise indicated.
4. Provide all safety switches where shown and at each motor which is out of site of, or greater than 50 feet from, the switch or panel from which the motor circuit is fed.
5. Provide all safety and disconnect switches with galvanized angle iron, unistrut, or other suitable supports where mounting on wall or other rigid surface is impractical. Where devices are mounted on drywall surfaces, provide galvanized back plate on opposite side of drywall for anchoring support. Switches shall not be supported by conduit alone.
6. Switches shall not be mounted on equipment when provided by this division. They shall be independently supported and shall not inhibit removal of any service panels or interfere with any required access areas.
7. Install disconnect switches used with motor-driven appliances, motors, and controllers within site of the controller position unless otherwise indicated.
8. Refer to Section 20 05 05 for engraved nameplates.

END OF SECTION

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